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FOOD INDUSTRIES

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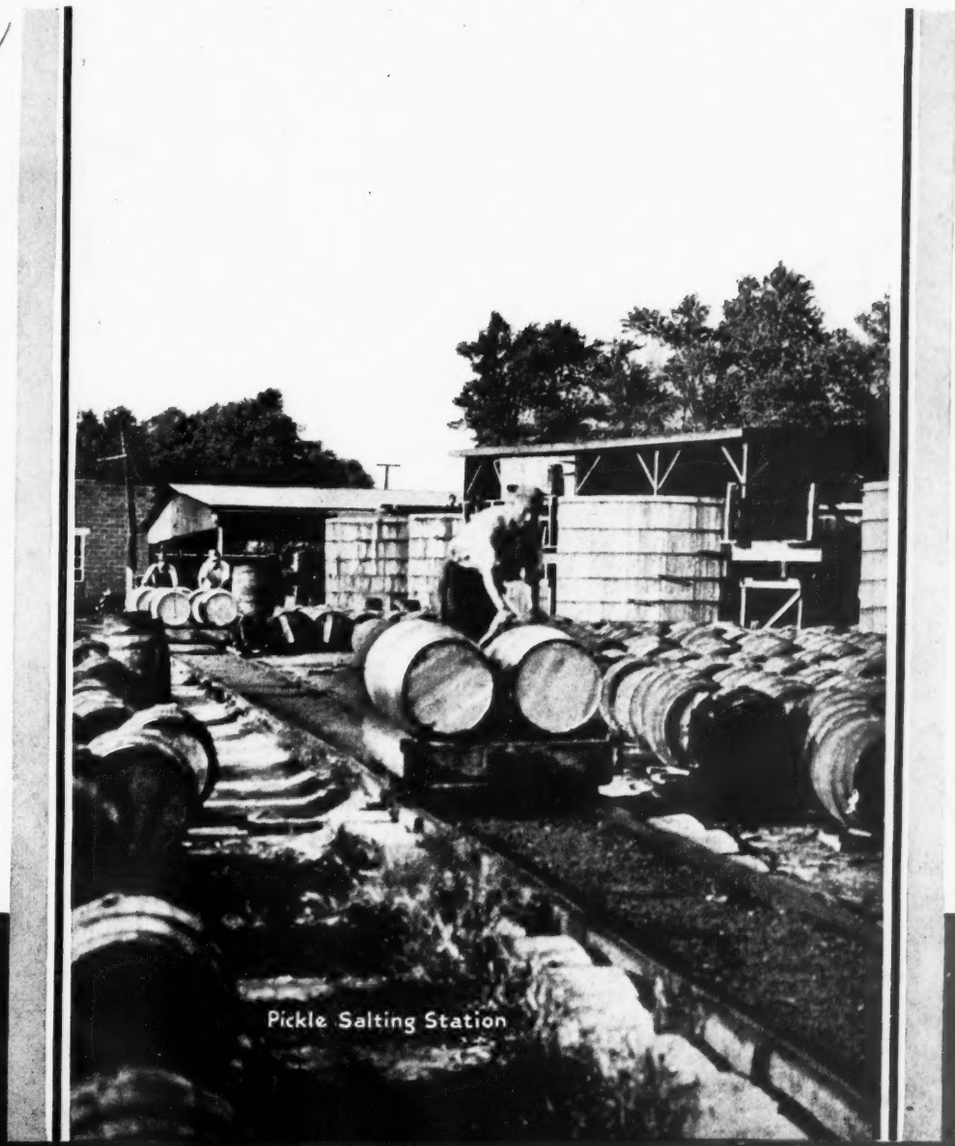


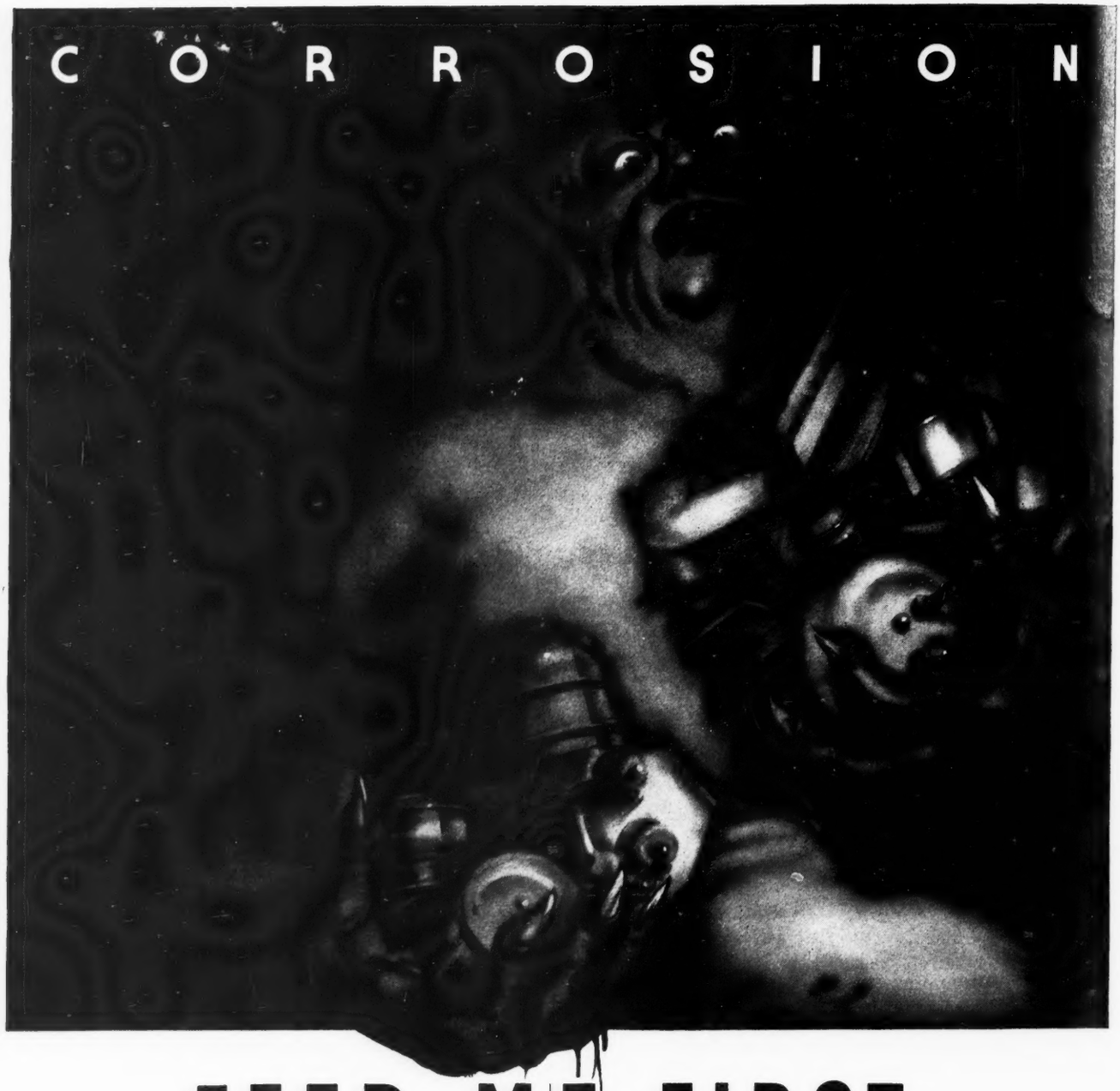
Pickle Salting Station

DECEMBER
1931

Processing Pickles
Package Design
Spices

COMPANY, INC.

TWENTY-FIVE CENTS PER COPY



FEED ME FIRST

Before profits, before salaries, before you sell a single order for foodstuffs, corrosion's insatiable appetite must get its graft . . . That is, unless your equipment is "Stainless." Stainless Steel, strong, tough and permanently beautiful, will break corrosion's bite. In terms of trouble-free service per dollar of cost, it is the most economical metal available for use in a food handling plant . . . Take a tip from the people who buy your products—see their own kitchens, their dining room tables—practically all cutlery and cooking utensils are Stainless Steel. They know and you should remember that the things which people eat are the very things which eat equipment . . . Stainless Equipment is excepted from this rule. Its use exempts you from paying corrosion's tax. Genuine Stainless Steel is manufactured only under the patents of American Stainless Steel Co., Commonwealth Bldg., Pittsburgh, Pa. Write for our new booklet.

STAINLESS STEEL

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VOLUME 3

FOOD INDUSTRIES

The Journal Devoted to the Problems of the Food Manufacturer

NUMBER 12

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"OUR *CONVEYORS* PAY US 40% *on the investment"*

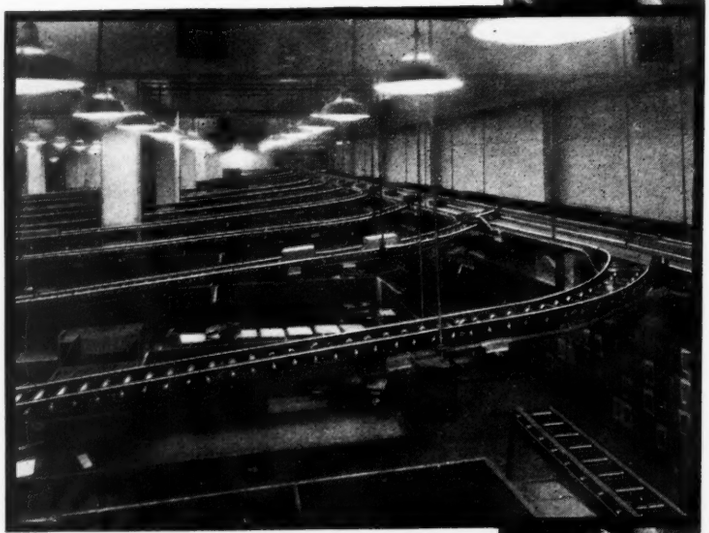
. . . says Bayuk Cigars, Inc.

BAYUK Cigars, Inc., Philadelphia, manufacturer of the well-known Havana Ribbon Cigars, receives an annual return of 40 percent from its investment in Lamson conveyors. In addition, officials of the company declare that without Lamson conveyors this plant would have to be 25 percent larger to handle the volume.

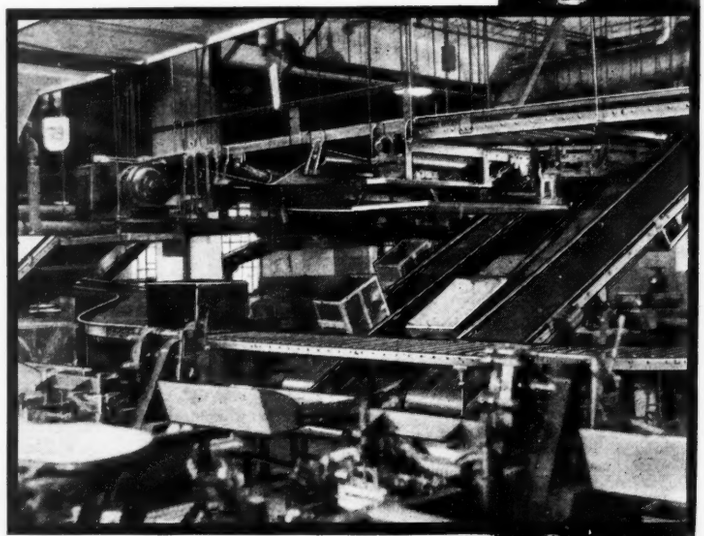
To-day, few plants can look for increased volume to give them a greater profit. Instead they must carve profit from the production costs of their present volume.

Just as in the case of Bayuk Cigars, Lamson has helped hundreds of widely different types of manufacturers materially cut their production costs. The inventory of work in process is reduced; men and machines are kept uniformly busy; peaks and valleys in the production line are eliminated; and the work of storage is made almost completely automatic.

The Lamson man will be glad to work with your plant engineers and executives in uncovering the potential profits in your production methods. His background of 50 years' experience in the solution of materials-handling problems is available to you without cost or obligation. Simply address the main office of the Lamson Company, Inc., Syracuse, New York.



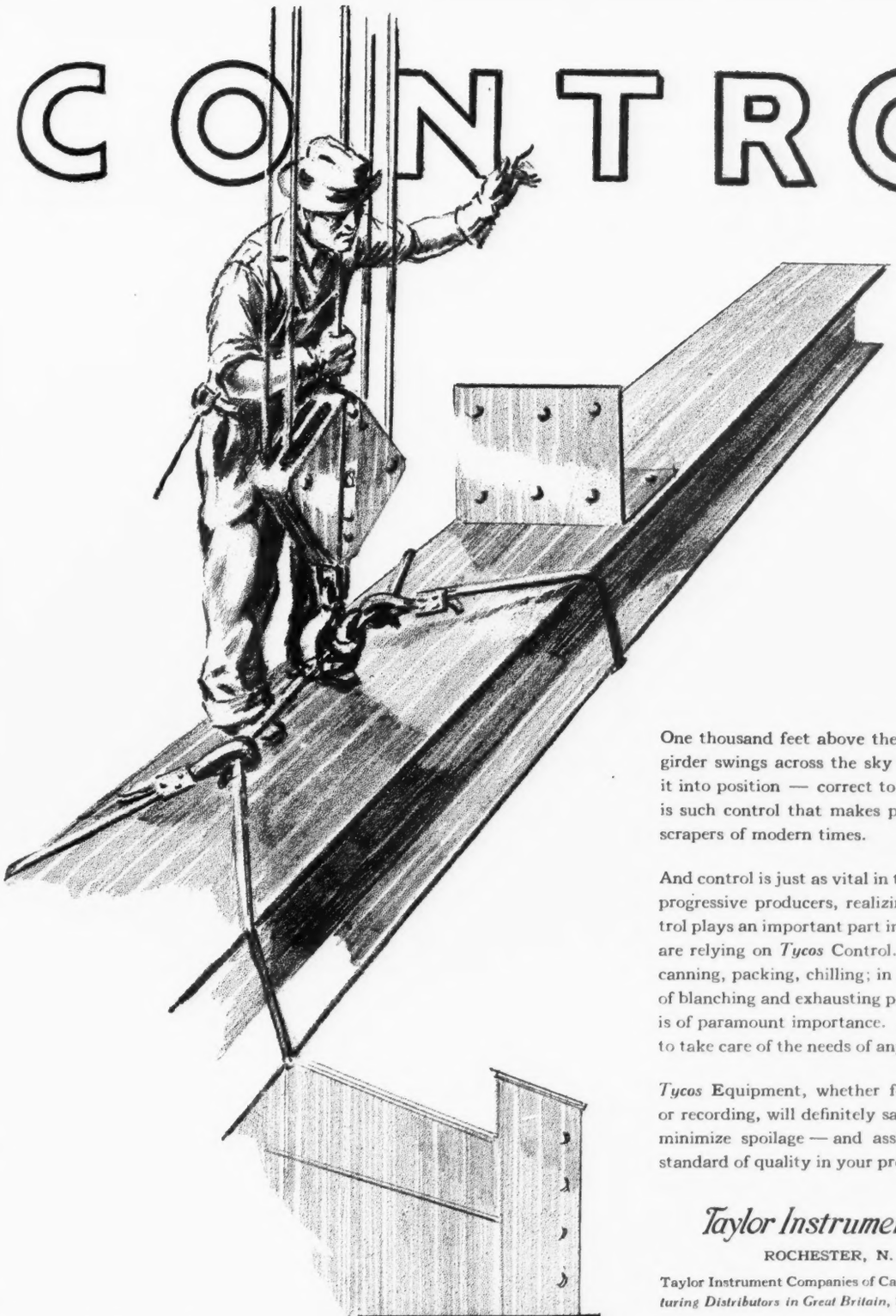
Belt and gravity conveyors bring the finished cigars to long rows of tables where they are inspected and sorted according to color.



Belt conveyors carry filler and binder tobacco to cigar-making machines. Other belts return empty tobacco cans to upper floors for filling.

LAMSON
CONVEYORS

CONTROL



One thousand feet above the sidewalk . . . a massive girder swings across the sky . . . skillful hands guide it into position — correct to a fraction of an inch. It is such control that makes possible the towering sky-scrapers of modern times.

And control is just as vital in the food industries. Many progressive producers, realizing that temperature control plays an important part in determining final quality are relying on *Tycos* Control. In such applications as canning, packing, chilling; in the preliminary processes of blanching and exhausting proper temperature control is of paramount importance. And there is a *Tycos* unit to take care of the needs of any one of them.

Tycos Equipment, whether for indicating, controlling or recording, will definitely save you time and labor — minimize spoilage — and assist you to a still higher standard of quality in your product. Ask us to prove it.

Taylor Instrument Companies

ROCHESTER, N. Y., U. S. A.

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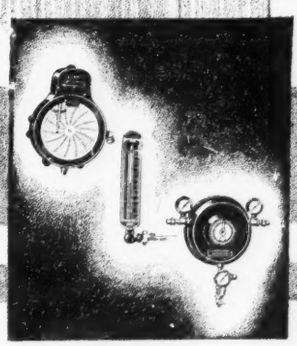
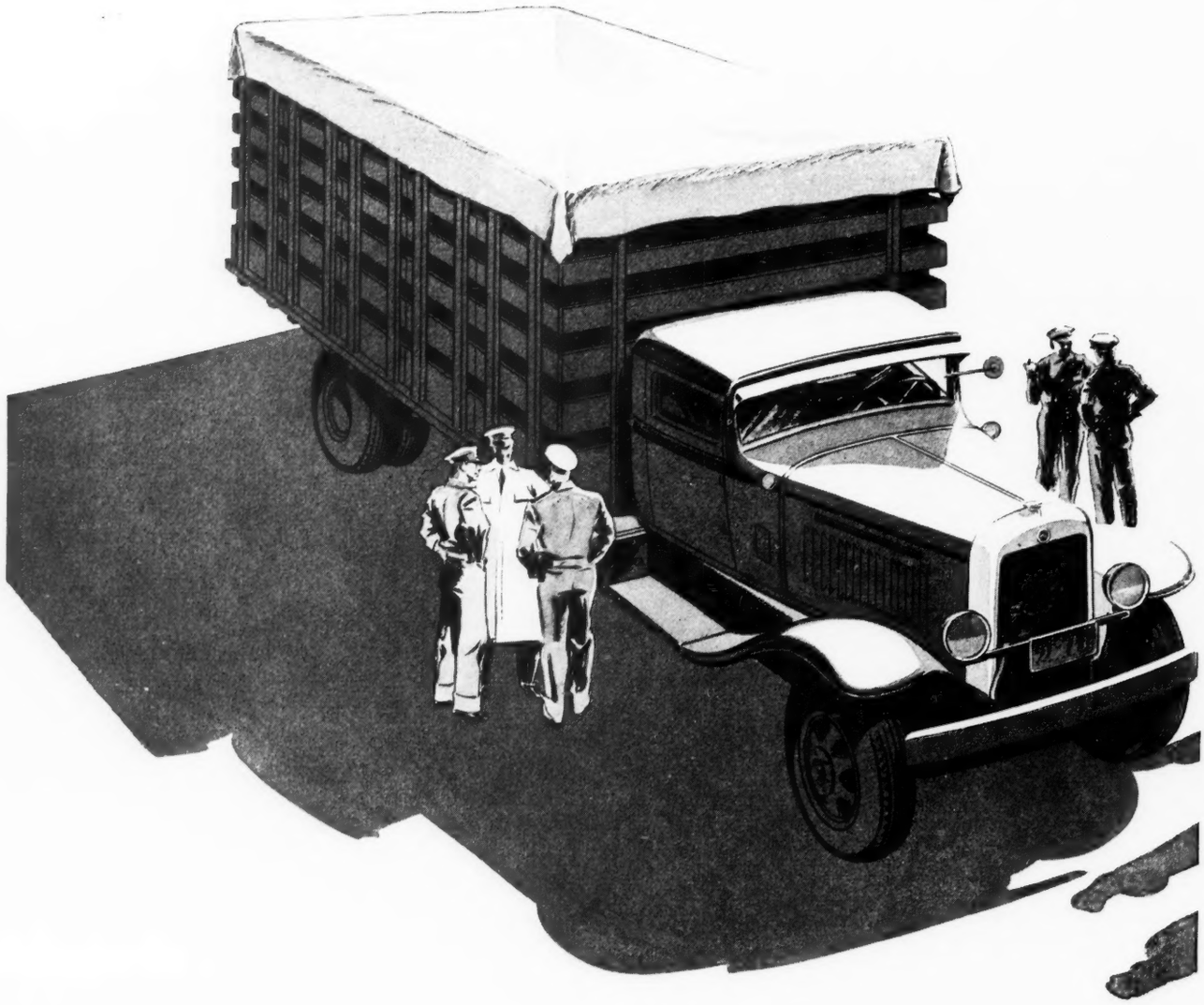
Tycos TEMPERATURE INSTRUMENTS



INDICATING RECORDING CONTROLLING



THESE MEN RODE TRUCKS IN 48 STATES AND FOUND NEW WAYS TO SAVE YOU MONEY

General Motors Truck transportation experts went into every section of the country and studied the trucking problems of the eighteen principal truck-using industries. They analyzed methods of distribution by truck, studied truck operating schedules, compared the efficiency of various types of trucks. They uncovered many sources of enormous waste in trucking practice, and they learned how the most successful truck operators in the country have eliminated waste. Now, they are prepared to bring you a complete digest of their findings, to apply the experience of hundreds of American

truck operators toward the most economical solution of your individual problems. Their counsel, through the General Motors Truck representative in your locality, is freely at your disposal. If you prefer, we will send you any one of the eighteen specific vocational survey reports or a new booklet (summarizing the results of our entire twenty-month survey activity) entitled "Cutting Distribution Costs with Motor Trucks." A coupon is attached for your convenience.

General Motors Truck Company,
Pontiac, Michigan.

Without placing me under any obligation whatever, send me a copy of your report, "Cutting Distribution Costs with Motor Trucks," also a copy of your survey, if any is available, covering my business.

Name_____

Firm_____

Business_____

Address_____

City and State_____

Time payments financed at lowest available rates through our own Y. M. A. C.

GENERAL MOTORS TRUCK COMPANY, PONTIAC, MICHIGAN (A Subsidiary of Yellow Truck and Coach Mfg. Co.)

GENERAL MOTORS TRUCKS AND TRAILERS

THE RIGHT TRUCK FOR EVERY RUN—1½ TO 20 TON

OPEN DISPLAY ~ the Keynote of Modern Merchandising

Nuts
Candy
Cookies
Crackers
Potato Chips
Seeds
Doughnuts
Noodles
Macaroni
Pop Corn
Cheese
and
many others

Bostitch - fasten your product on Attractive Counter Cards!

That's the most effective way of increasing the sales of merchandise which can be put up in small packages. Hundreds of alert manufacturers are now capitalizing this splendid selling idea.

And for sealing, fastening and attaching their products, most of them are using Bostitch — because it is rapid, accurate, reliable and easy to operate.

There is such a wide range of models that a stock machine can be adapted to your work and not force you to adapt your work to some one type of machine.

If you have an Open Display problem, call the nearest Bostitch office. There is one in every large city . . . or send a sample of the product and an outline of your plan directly to our engineering department in East Greenwich, Rhode Island . . . Mail the coupon today.

BOSTITCH

TRADE MARK REGISTERED

THE MODERN METHOD OF FASTENING

BOSTITCH SALES CO., East Greenwich, R. I.
Gentlemen: Send me free condensed catalog and folder showing over 100 models of Bostitch machines.

Name..... *Address*.....

DO YOU WANT TO CUT COSTS?

Packomatic Container Sealer, with speed of (800) cases per hour, recently installed at The Kellogg Company, Battle Creek, Michigan.

IF you want to lower production costs and improve your package appearance;

IF you want to save labor and conserve floor space;

IF you want your production methods to be up to the minute;
In short, if you want to make more profit — Re-build your business to meet present day conditions.

No amount of first class hand-packaging, can make a business today keep pace with the production needed for more profits. Modern packaging methods are based on mechanical handling.

Over (2,000) large and small manufacturers of every type, have found that Packomatic packaging methods bring additional profits. In every instance Packomatic improves the package, saves labor costs; and widens markets.

It will cost you nothing to have one of our Engineers show you Packomatic economy methods. PHONE — WIRE — WRITE — We'll meet you any time, any place.

THE PACKOMATIC LINE

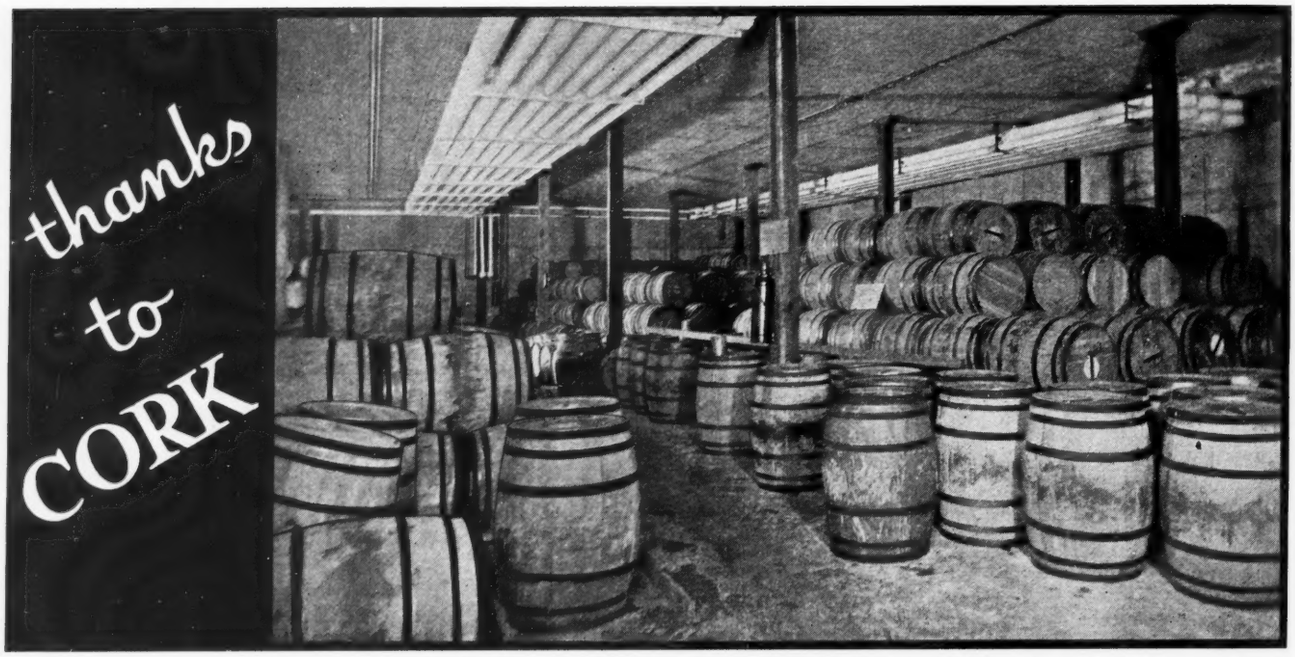
Carton Forming Machines
Carton Sealing Machines
Automatic Net Weight Scales
Automatic Gross Weight Scales
Automatic Volumetric Fillers
Automatic Lining Machines
Wax Wrapping Machines
Automatic Cartoning Machines
Semi-Automatic Net Weighers
Semi-Automatic Gross Weighers
Container Sealing Machines
Can Labeling Machines
Coupon Inserting Machines
Boxing Machines
Packing and Wrapping Tables
Special Machinery.

PACKOMATIC
PACKAGING MACHINERY

J. L. FERGUSON COMPANY, JOLIET, ILLINOIS

Branch Offices: NEW YORK ST. LOUIS LOS ANGELES

Quick-frozen cherries stay fresh for months



Barrels of fresh cherries, kept fresh in the storage rooms of the Fruit Growers' Union, Traverse City, Mich., by Armstrong's Corkboard insulating walls and ceiling.

FRESH, ripe Michigan cherries—in December! That's what the Fruit Growers' Union, of Traverse City, Michigan, provides — with the help of corkboard insulation.

Cherries are quick-frozen at the height of their ripe lusciousness. Careful storage, in rooms protected by corkboard insulation, guards this freshness for months. Armstrong's Corkboard was chosen to insulate freezer and storage rooms of the Fruit Growers' Union.

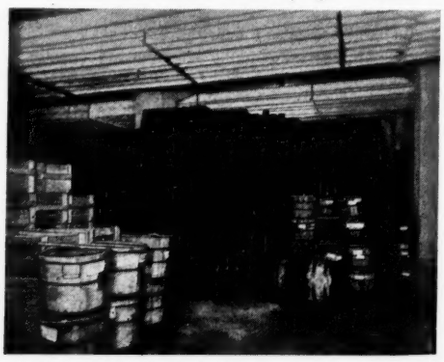
Food storage relies on cork

All quick-freezing processes require good insulation. In the food industry, especially, the physical characteristics of corkboard have made it the standard insulation. For more than a quarter of a century, Armstrong's Corkboard has been protecting low temperatures in cold storage plants throughout the country. Cork is highly resistant to moisture, the deadly enemy of insulation. Food spoilage can be eliminated in properly refrigerated storage rooms insulated with corkboard.

Whether you need low temperatures for quick-freezing, or more normal cold for storage, Armstrong's Corkboard and Cork Covering provide economical insulation. Properly erected (that's important) cork serves for many years without deterioration.

Let Armstrong engineers tell you about Armstrong's Corkboard Insulation and the Armstrong Contract Service. These engineers will gladly consult with you on unusual installations—their long experience in insulation is at your disposal without obligation. Address Armstrong Cork & Insulation Company, 948 Concord Street, Lancaster, Penna.; Canadian offices in Montreal, Toronto, and Winnipeg.

Armstrong's (A) *Product*

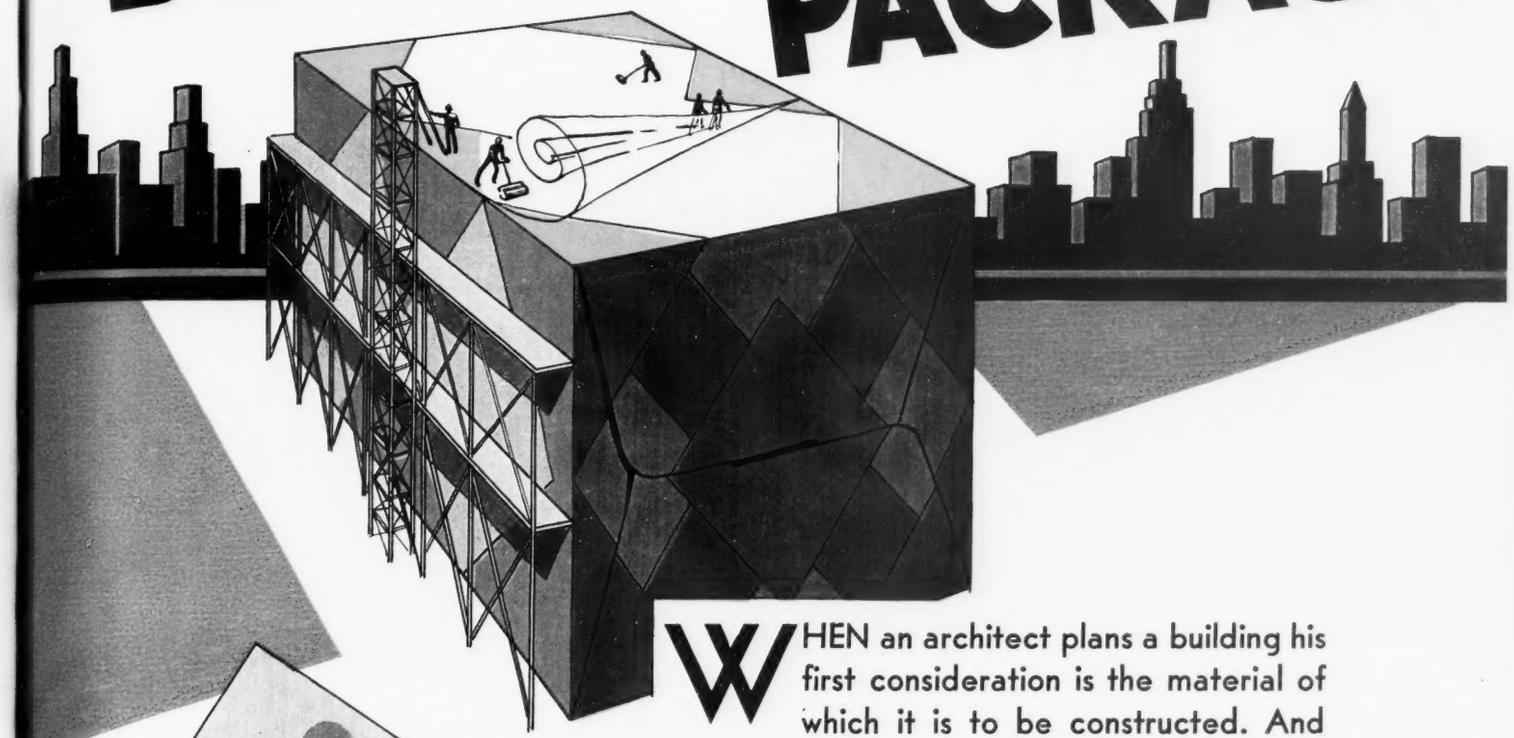


Many months ago the cherries in these cans were picked from the trees. Quick-freezing and careful storage in rooms guarded by Armstrong's Corkboard keep them fresh.

Armstrong's Corkboard and Cork Covering

FOR ALL COLD ROOMS AND COLD LINES

BUILDING THE PACKAGE



This booklet tells of the work the KVP Laboratories are doing. It will be sent you gladly without obligation.

WHEN an architect plans a building his first consideration is the material of which it is to be constructed. And this material is selected to best serve the purpose for which the building is intended.

In building the package for your product, do you first consider the material that will provide the utmost in protection against deterioration and contamination?

In the KVP Research Laboratories packaging materials are studied and tested in direct relation to your product. The material best suited is selected by rigid tests under every condition your product must face.

It is only by such research in the hands of a trained staff that you can be assured of a package that will stand up and perform its protective function.

Let us help select the material for packaging your new product, or your old one for that matter, and be sure of obtaining the best package.

KVP PROTECTION PAPERS

KALAMAZOO VEGETABLE PARCHMENT CO.

KALAMAZOO ❖ MICHIGAN

GETTING THE "BIG IDEA"

TINY bubbles rising from a tea-kettle—that was all. It had been a common sight to generations of men.

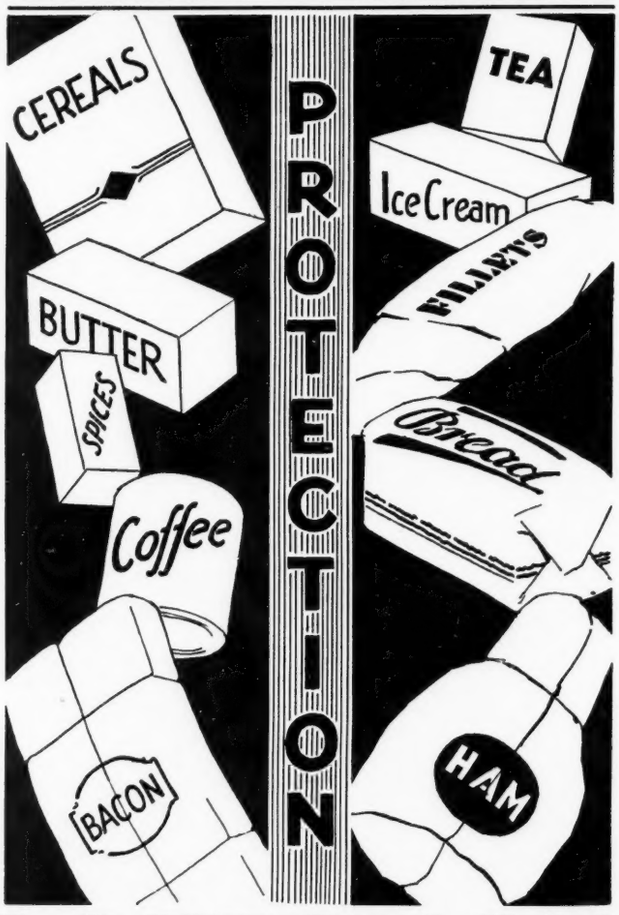
But the vision James Watt saw, in the tiny clouds of steam, the power which should re-make the world — he had the "big idea."

Just so the business of this Company has been built around **Ideas!** Not simply making Paper but developing all its possibilities for the service of the people. On this service has been established the growth and continued success of "The World's Model Paper Mill."

This service is more than a question of the right wrapping; it means full protection for all kinds of food products, under all conditions. Every member of this Company — from the president to the humblest in overalls, is on the alert to find better ways to fulfil present needs and anticipate the new.

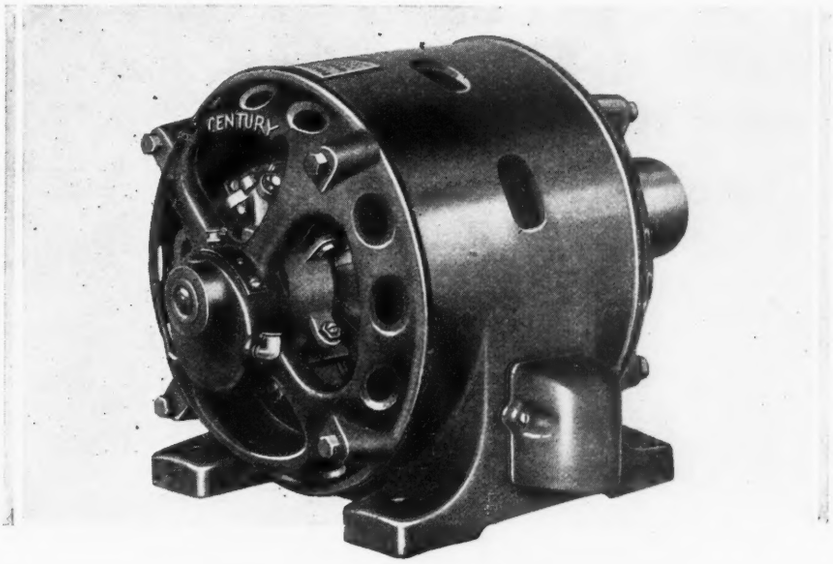
KVP Laboratory research experts are at your command; if need arises for some special, exclusive type of protection, do not hesitate to call on us for advice and suggestion.

KALAMAZOO
VEGETABLE PARCHMENT CO.
KALAMAZOO -- MICHIGAN



KVP PROTECTION PAPERS ♦ ♦ ♦

THEY KEEP A-RUNNING



1 Horse Power Century Type RS Repulsion Start Induction Single Phase Motor

Continuous Operation

Proper and continuous lubrication is only one of many vital features that makes Century Type RS Single Phase Motors "Keep a-Running."

One Year's continuous operation, without re-oiling, is assured by the Century Wool Yarn System of Lubrication—which, together with Phosphor Bronze Sleeve Bearings, is standard equipment on all 1½ horse power and smaller sizes . . . All 2 horse power and larger sizes are regularly furnished with oil ring lubricated phosphor bronze bearings. Grease lubricated ball bearing motors are available in most sizes.

Built in all standard sizes from 1/8 to 40 horse power.

Century MOTORS

40 U. S. and Canadian Stock Points and More Than 75 Outside Thereof

CENTURY ELECTRIC COMPANY, 1806 Pine St., St. Louis, Mo.

SINGLE PHASE, THREE PHASE AND DIRECT CURRENT MOTORS • MOTOR GENERATOR SETS • ROTARY CONVERTERS • FANS AND VENTILATORS

FOR MORE THAN 27 YEARS AT ST. LOUIS

LUCKY STRIKE
CIGARETTES

in the unique Humidor Package with the "Lucky Tab"

Wrapped on our machines

THE impressive battery of Cellophane wrapping machines shown here is only part of a large number in the service of The American Tobacco Company.

Hour after hour, day after day, these machines are driven at top speed to turn out the millions of packages of Lucky Strikes which the world demands. Rapid, smooth, dependable production is essential.

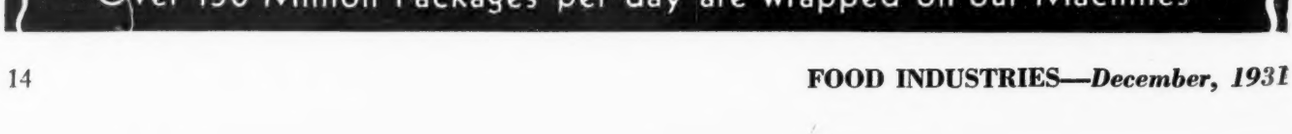
But of equal importance, from a *sales* angle, is the uniformly neat, smooth wrapping which these machines produce. It required intensive research and experimentation to perfect wrapping machines which could handle Cellophane satisfactorily—due to the unusual characteristics of this most modern of wrapping materials. This problem, like many other problems in packaging, was solved by Package Machinery Company engineers.

The wide-spread use of Cellophane also demanded that we meet the individual characteristics of a large variety of products—today, cigars, candy, cake, marshmallows, mints, sewing tape, etc. are all wrapped on our machines.

Bring your packaging problems to us

Our machines are adapted to the use of all forms of packaging material—printed wrappers, foil, Cellophane, glassine, waxed paper. We will be glad to advise you regarding the best manner in which to package your particular product. Consult us.

PACKAGE MACHINERY COMPANY
Springfield, Massachusetts
NEW YORK CHICAGO LOS ANGELES
LONDON: Baker Perkins, Ltd.



BLANCHING...
BRINING...
WASHING...
SYRUPING...

Self-supporting Monel Metal utility tank at the plant of LIBBY, McNEILL & LIBBY, Sacramento, Calif. This tank is used for blanching, brining, etc., and was fabricated by the users.

These MONEL METAL tanks are good for many canning purposes

WHERE is the modern canning factory that hasn't constant need for corrosion-resisting, easy-to-clean Monel Metal tanks? There's scarcely a plant processing fruits, vegetables and other food products that can't profitably use tanks of this versatile Nickel alloy.

Monel Metal tanks are ideal for blanching, brining, washing, syruping and other major steps in modern canning practice. Due to their high corrosion-resistance, they are unaffected by processing solutions. Consequently, they minimize the danger of bacterial growth and contamination. They protect the natural flavor and color of the product.

Monel Metal tanks have a glass-smooth, non-porous surface that is easy to clean and keep clean...a surface that never retains stale odors. Monel Monel can't rust and it has no coating to chip, crack or wear off. Its steel-like strength insures years of trouble-free service under severest conditions.

Monel Metal is a high Nickel alloy. Nickel is the whitening, strengthening partner that imparts attractiveness, corrosion-resistance and durability to Monel Metal and many other modern alloys. When you are in the market for new equipment, remember that "Nickel Alloys Perform Better Longer" and that Monel Metal is nearly 70 per cent. Nickel.

INCO MONEL METAL TRADE MARK

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STEEET, NEW YORK, N. Y.

A HIGH NICKEL ALLOY

MONEL METAL

NICKEL ALLOYS PERFORM BETTER LONGER

Monel Metal is a registered trade mark applied to a technically controllednickel-copperalloy of high nickel content. Monel Metal is mined, emelted, refined, rolled and marketed solely by International Nickel.

What sort of job are YOU doing?

YOU know what the National Canners Association is doing to improve the sale of canned foods. You've seen the advertising. And, by now, you've had time to plan what *you* are going to do. You've had ample time to get going.

What have you decided? What have you done?

Here are just a few of the things you *should* have done—and *should be doing*—to make this campaign increase the use and sale of your canned foods.

1. If you employ salesmen, have you made them see the importance of this campaign to you—and to them? Have you instructed them to work on the trade for canned foods displays, specials, advertising? Are they getting retailers to feature Christmas gift assortments of canned foods—an idea played up in the December 19th advertisement in The Saturday Evening Post? Their job is not to *stock* the retailer but to help him sell. Their job is to help him move more goods—canned foods of all kinds, all brands. And, as the canned foods market improves, your brand will take care of itself.

2. If you use brokers, have you told them *you* are back of this drive—and insist that they work as they never have before? The broker knows the need for a better canned foods market. It's up to you to make him understand that this is *his* opportunity too—and see that he works on the trade to *make* conditions improve.

3. Wholesalers are an important link in the chain. Have you told them you expect their support? Have you gotten them to hold salesmen's meetings—to go after the retail trade for canned foods publicity and display?

4. What are you doing right in your own community? You *can* do a lot. You can get the cooperation of your local newspaper. You can get your local retailers to make an *extra* effort on canned foods. You can get the support of your commercial clubs, your fraternal organizations, your Grange—for all of them will be quick to see that they are vitally concerned, as well as you, in the success of this great movement.

The canner who wants better movement of goods, better prices, should be doing all these things—and more. He should wrack his brains for ways in which *he* can add to the big push—do everything within his power—go at this job tooth and nail, making up his mind that he is not going to let such an opportunity pass without putting back of it all the merchandising sense, selling and hard work he's got.

The steam you put back of this drive is vital in piling up a tremendous pressure for better conditions. Do something—*and do it now.*

NATIONAL CANNERS ASSOCIATION
WASHINGTON, D. C.

FOOD INDUSTRIES

The Journal Devoted to the Problems of the Food Manufacturer

Volume 3.....Established 1928—McGraw-Hill Publishing Company, Inc.....Number 12

NEW YORK, DECEMBER, 1931

•

Laurence V. Burton, Editor

Where Will This Lead Us?

WE TAKE ISSUE with those who put sole blame on the so-called capitalistic system for all that is wrong with present conditions. There is an amazing amount of sloppy thinking and most unsound utterances abroad today. Nothing is inherently wrong with individual ownership or individual initiative. Call it capitalism, if the name pleases you more. Call it decentralized control. Call it anything you like. By whatever name you describe it, it is absolutely essential to life, liberty, and freedom in the pursuit of happiness. Take it away and there remains nothing but the drabness of mere animal existence.

IF THERE IS ANY EVIL in the individualistic system, it is in the individuals who make it up. Selfishness and greed are no greater human faults than resistance to change, lack of adaptability, or lack of foresight.

CAN WE CONCEDE that there is more virtue in a farmer who continually raises more and more wheat, more cotton, or more tobacco, than in a banker who fosters more and more factories? Is it more moral to build more houses than people can buy than it is to manufacture more food than they can eat? Is it good that a mechanic shall know how to run only one kind of machine? If so, then we should approve of the old-style, pre-chain, independent grocer and say that he should continue in his old unsuccessful ways. Somehow it appears that it is not our system but we ourselves who are at fault; our unwillingness to change with the times, that brings us trouble.

WE HEAR that every man is entitled to a job, but is this true? It smacks of another scheme of things. Under our present-day life it is true only that every man is entitled to an opportunity to work, not that he is entitled to a job of working for somebody else. There are not enough jobs because there are not enough men to go around who know how to make jobs. And the more highly specialized our civilization becomes, the more important these men become. An actual shortage of this type of man exists.

DOES ANYONE believe for a moment that a highly organized socialistic or communistic régime, such as many critics would like to clap down upon us, could develop more self-starters, more men than we already possess who could create jobs? If our present civilization cannot develop creative employers rapidly enough, we must forego too much specialization.

AFTER ALL, the essential difference between our system—the individualistic system—and the socialistic or communistic system is that of source of control. In America we decentralize control. Individual initiative rises or falls in accordance with its own ability, whereas in Russia, for example, the control is centralized. Mistakes or errors of judgment are paid for by dollars in America; in Russia, by the firing squad or by an economic or social ostracism that frequently involves literal starvation.

TRUE WISDOM is comparatively rare in this world, and in its absence, in sufficient quantity, many of our leaders would substitute for it a system of planned economy, apparently little dreaming that it is a step toward centralized control. This big difference between our existing economy and the plan of centralized control is that, under that plan, with no more wisdom than is now available, someone would be empowered to tell us what we might or might not do, and we would be compelled to obey.

WE SHOULD REMEMBER always that planned economies are but mechanical substitutes for wisdom. The wise man sees what is ahead and acts accordingly. A planned economy may permit us to see what is ahead, just because it is planned. But the plan will be realized only if it can be enforced upon the wills of other men.

CAN IT BE DONE? Figure it out for yourself. Any text book of history is largely a record of attempts to enforce others' ideas, others' regulations, others' doctrines on unwilling people. "The only way to say 'must!' is to kill!"

British Food Tariffs

WHETHER Britain will impose a food tariff is hardly a moot question. The British dinner table is almost sacrosanct, and your Britisher clings to his ideal of duty-free foods with all the intensity of purpose that he exhibits in observing his holidays and week-ends. Previous governments have proposed tariffs on foods, and the idea is nothing new. But no government in England has yet survived after recommending a food tariff. And none has ever been imposed.

This explains why Ramsay MacDonald so quickly exempted foods when he proposed the emergency tariffs permitting up to 100 per cent *ad valorem* duties. Despite the contrary beliefs of foreign observers, it appears to us that the permanence of British temperamental characteristics will still preclude tariffs on manufactured foods.

Will Domestic Tariffs Continue Indefinitely?

ONE of the questions uppermost in the minds of American manufacturers has been, What will England do to our export business when she puts a tariff on imports? Since England is ceasing to be the money center of the world, the basic conflict between credits and tariffs begins to disappear. Prominent English business men recognize that no nation can continue to be a world banker and at the same time raise tariff walls between herself and her creditors. But with London's waning importance as a world bank, there is a corresponding disappearance of the conflict of purpose between tariffs and credits.

Such a principle holds for the United States as much as it does for England, and if the existing trend in world affairs continues, then let us beware of attempting to build industries that can be successful only behind tariff barriers that some day will be markedly diminished, if not entirely wiped out.

Sharpen Your Wits on This

AT A little neighborhood dinner one night in November a lawyer for a large bank related an interesting yarn about a wealthy client. The tale is passed on to our readers to show how a wisenheimer sized up the affairs of a corporation in which he was interested; how a really wise, astute man learned much from very meager sources of information; and why he continues to be wealthy. For the benefit of the younger customers we will explain that a wisenheimer is a man who knows everything, is always in on everything, never gets caught, and seldom loses any money.

Mr. Wisenheimer owned 40,000 shares in a very large food corporation which his bank had recommended to him as a sound investment. Naturally, he wanted to know how its affairs were prospering after the merger had passed into history and it should have been doing business in a methodical way. He had never met the president of the corporation and requested our legal friend to arrange a luncheon engagement to bring them together. In the usual New York manner they met at a club, ate, chatted and smoked, departed.

Conversation touched on the weather, football, prize fights, movies, drama, politics. The business in question was not even mentioned, yet in the taxi afterward Mr. Wisenheimer smoked in silence for a few minutes and then remarked, "I shall sell my shares in that company at once."

In less than a week he had sold out all of his 40,000 shares. That happened in 1928. Since that time the history of the market price of those shares has been mostly downward and the corporation has never paid a dividend.

What did Mr. Wisenheimer discern in this very innocuous conversation at lunch that enabled him to decide correctly that his money was in incompetent hands? You are in possession of all the facts. Can you arrive at the correct deduction that this man reached? Why did he decide to sell out?

Too Much of a Good Thing

SOLID carbon dioxide affords one of the best means of preserving ice cream that has ever been discovered. It is being used with great success by many companies. Yet this very success is leading to its over-use; so much so that ice cream with the consistency of high-grade billiard balls is beginning to arouse the wrathful complaints of consumers.

One manufacturer has encountered so much trouble of this kind that he now makes a practice of sending out a service man with large orders, to see that the temperature of the cream, as served, is not too low. In spite of this, trouble is still encountered. Just recently his product was served at the banquet of a large and influential organization. The service man who went along with the order took particular pains to instruct the chef as to the proper handling of the ice cream, so that its temperature would be just right when it reached the diners. The chef swore he understood; but, alas, the beautiful molds might as well have been cut from marble, for when they reached the table they were unyielding to any implement there available.

Whether an article be solid carbon dioxide, salt, or sugar, its use should be carefully fitted to the needs of the case. Using too much is not only a waste of money but may spoil the product with which it is used.

Don't Neglect the Follow Through

THE long expected advertising campaign of the National Canners' Association has at last come into being. Much work had to be done before it could be started. Back in 1920 a cooperative campaign costing millions had to be abandoned for several reasons, but principally because the money gave out. Of course, that would stop anything; but the former venture was not well-conceived. It was directed by an educational committee that was, in itself, of convention size. Members from nearly every state in the Union tried to pass on copy, art work, sales promotion plans. Passing a motion was like getting a bill through Congress. In contrast, the committee in charge of the 1931 advertising campaign is composed of only three very able executives.

The old campaign lacked one fundamental, which was that, in the process of winning new customers, there was no assurance either to housewife or the industry that every can of food would be of pleasing quality. The industry now has the aid of the McNary-Mapes Law, which compels products of sub-standard quality to be so designated. Newly won consumers cannot be disappointed if they can read the English language.

To finance the 1920 campaign the industry assessed itself on a per case basis. Not everyone came in, and, of

those who signed up, not everyone paid his assessment in time to prevent calling on the underwriters. It could not survive the depression. The 1931-32 campaign, however, is being supported by the American Can Company and the Continental Can Company, two large concerns with ample resources to do a good job.

The canners have a wonderful opportunity to increase their business by the most successful means: advertising. They must do their part, however, or the campaign will not achieve its greatest success. Its ultimate aim, of course, is greater profits through more sales, and more profitable sales. They must not only sell more goods under the stimulus of the campaign but they must gear production to demand. No profits are obtainable by producing so much that the surplus drags prices down to profitless levels.

The National Macaroni Manufacturers' Association has just closed up, rather prematurely, a similar cooperative campaign. It failed to carry on largely because of suspicion and differences of opinion between makers of bulk goods and packaged goods. It failed also because its support had to come from a multitude of sources, and collections have been just as difficult in 1931 as the canners found them in 1921. The set-up for the canners' campaign, however, is well nigh perfect. All that the canners have to do is to sell the goods. If they are experienced in the use of advertising they know that it does not take the place of sales effort. If, on the other hand, they expect to find orders rolling in without a selling campaign that ties in with their association's advertising, the whole expense will have been in vain.

Can You Sell Another's Services?

MANY ways to help are possible in the current nation-wide efforts to bring about relief from the effects of the depression. It is important to keep in mind that there are two distinct major phases of the problem, and they must not be confused. All of us who are able must give help in both ways.

Emergency aid must be given where it is necessary. Contributions to community chests or other forms of organized relief will make this possible. Donations should be made promptly and generously. But the other phase of the problem is almost equally as important. It involves getting jobs for the unemployed, for employment is the only cure for unemployment. And getting under way this form of organized relief calls for time, energy, patience, and a lot of work. Trade and technical associations should organize to try to place members of their crafts or professions.

Remember that there is no harder job in the world than that of finding a job during a depression. Very few men know how to sell their own services, but many men know how to sell the services of others. To be sure, it takes time, and it cannot be denied that those who still remain employed are now usually doing double duty and working at a war-time tempo.

In order to man the working committees that are doing the footwork, the methods followed by certain New York groups, particularly the engineering societies, are worthy of study. Many of the most active men on these working committees are themselves among the unemployed, but they have volunteered their services. Fortunately, many of them are far from being broke. Some of them are normally high-priced executives. The study and effort they are contributing in behalf of their fellow man, instead of looking out for their own future, is one of the finest pieces of self-sacrifice we have seen for years.

Those who are charged with organizing these job-finding services must lean heavily on the unemployed, particularly on the more mature men who have not become alarmed at the unexpected turn in their own affairs. These men will welcome the opportunity to serve, and they will find that one can gain the ear of a busy executive to discuss a job for a third party much easier than he can to discuss a job for himself. (This opportunity to make new contacts is too rare to be neglected).

Feed Manufacture Is Not All Joy

ANIMAL feeds are often a profitable byproduct from the manufacture of foods for human consumption and there are, no doubt, many food manufacturers who are planning to enter this field as a sideline or as an outlet for materials unsuitable for human food. They should not do so hastily. The production of high-grade animal feeds is not a simple matter; hardly as simple as preparing human food, in fact.

Human beings eat many foods not particularly valuable to them from a strictly nutritional or caloric standpoint, while no owner of domestic animals will knowingly indulge his livestock in such gastronomic luxuries. The buyer of animal feeds wants, and should demand, as much weight-making, egg-making or milk-making food material, and as little inert or indigestible material, as he can get for his dollar. To see that he gets is, state and federal laws require animal feeds to be labeled with a guaranteed analysis in terms of protein, carbohydrate, fat, fiber, and so on.

There is, then, much more to animal feeds than just something that an animal will eat. Animal feeding is done for a definite purpose, and feeds should be made or compounded with that purpose in view. Otherwise the manufacturer may find his product is worthless or at least of small value either nutritionally or monetarily.

The reported work on animal feeding experiments is voluminous and covers almost every known kind of feed. From it the prospective manufacturer of byproduct feed should be able to get some idea of the probable value of his foodstuff. If not, it will pay him in the long run to make some feeding experiments on his own account so that he will know what his feed means in terms of pounds of milk, dozens of eggs, or pounds of flesh.

Keep Up Your Library

WITH this issue is printed the annual index for the current volume of FOOD INDUSTRIES, which we recommend to our readers for study to observe the breadth of subjects which have been covered. Frequently we have been asked by readers when we are to publish articles on subjects which have already been discussed. This fact could have been determined by consulting this, or earlier, indexes had their files been maintained intact.

Most plants maintain technical libraries, to which FOOD INDUSTRIES is an important addition. It is for their benefit that the annual index is prepared. The whole make-up of the magazine is planned to facilitate binding —a procedure which is recommended to readers, for it is practically impossible to supply back numbers to those who have lost them through ill-advised lending, by gift, or otherwise. Binding will prevent such losses.

This Business of Pickling

Part Two — Sorting and Processing; Curing Genuine Dills

By W. G. WORMLEY

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WHEN pickles have been brought to the cured state, as outlined in a previous article (FOOD INDUSTRIES, Vol. 3, November, 1931, p. 484), they are described as salt stock, and are ready for manufacturing. Barrels holding 6 bu. each, or specially constructed tank cars having a capacity from 700 to 1,400 bu., are used to transport the salt stock from salting stations to the finishing plant. Here they are graded into 20 or more size classifications in which pickles are marketed. The basis of this classification is the 45-gal. barrel. By "4,500-size," or "4,500-count," for example, we mean a size approximating 4,500 pickles to the 45-gal. barrel, or 100 to the standard gallon; by "3,600-size," or count, we mean 3,600 to a 45-gal. barrel, or 80 pickles per gallon.

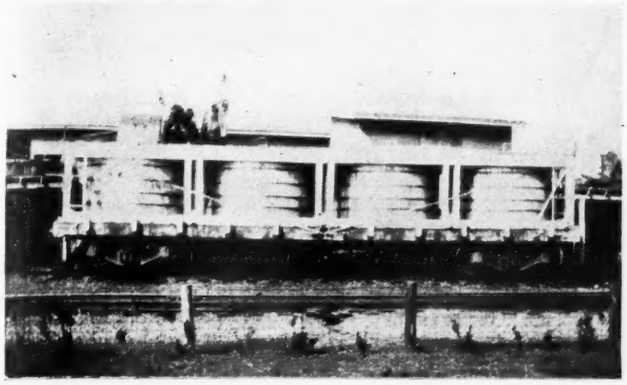
Sorting must be carried out well in advance of the rush shipping season for finished goods, which usually is the late summer or early fall. Ordinarily, the pickles go into storage tanks holding a single size, although occasionally they are manufactured at once into finished goods. Certain sizes are always more popular than others, although it is possible to alter the popularity of the sizes to some extent by increasing or decreasing prices. However, if a definite size is required to fill an order, they may be obtained either by going to the appropriate tank containing the proper size, by purchase of assorted sizes from outside sources, or by sorting out the proper size from the vat-run salt stock. Unfortunately, the latter is a rather slow process and it may be necessary to sort over several tank car loads of salt stock before a few barrels of the needed size are obtained. For this reason, the finishing plant usually has a sorting crew at work practically the year round to insure a balanced inventory of assorted salt stock. The cost accounting system necessary at this particular point is rather complicated, because of the variation in the sizes of pickles and the quantities of the various sizes found in any lot of salt stock (FOOD INDUSTRIES, Vol. 2, September, 1930, p. 388).

Processing is the next step in the manufacturing operation. In the pickle industry, this refers specifically to reduction of the quantity of salt in the salt stock from that necessary to insure proper preservation in bulk storage to a quantity which is palatable. From 30 to 60 bu. of pickles of a given size are placed in the processing tank and covered with the quantity of fresh water necessary to lower the salt content to that required by the finished pickle formula. To assist the freshening process, the water is heated by a steam siphon to 100 deg. F., and the pickles are frequently agitated with a wooden paddle or by compressed air. Usually, 36 hr. is required to process a tank of pickles.

The relative proportions of water used in processing regulate the quantity of salt removed by the operation. In reality it is a simple dilution operation; that is, it is simple if the dilution operation is allowed to reach an equilibrium, so that the salt concentration within the pickles is the same as that in the water.

Occasionally it is necessary to hasten the processing operation, and this can be done successfully only where the necessary technical supervision is exercised. In brief, the short cut depends on the fact that every bushel of 50 lb. each of salt stock contains a definite quantity of salt, a part of which is to be removed by diffusion through the body and skin of the pickles. Rather than wait the 36 hr. necessary for complete diffusion and establishment of equilibrium of salt concentration throughout the pickles and the water of the process tank, a definitely known part of the salt content may be removed more rapidly by using double or triple the amount of water under carefully controlled conditions. Naturally the salometer readings must be taken frequently and when calculations reveal that the portion which it

Salt stock in storage at a finishing plant. Covers are keyed down with timbers to keep pickles submerged at all times



Loading a pickle tank car at a salting station in Roxie, Miss.

is desired to remove is in the water, the pickles are immediately taken out.

Processed pickles coming out of the regular method will have a salt content approximately equivalent to a brine of 18 to 24 deg. salometer, depending on the formula used by the manufacturer. When the shortcut is used, the outer portion of each pickle as it comes from the processing is much fresher than this figure and the central portion much saltier. In the course of time, diffusion within the pickles will restore equilibrium, regardless of the fact that they may be in the vinegar by that time. The processing can be shortened as much as 24 to 30 hr. by the method outlined, but it is hazardous unless under strict technical control. If only common labor is available, it should not be attempted.

After the processing operation, the next step will depend upon whether the pickles are to be sold as sour or sweet pickles, or as processed dills. Processed dills are made by placing the processed pickles in barrels or small tanks, covering them with a liquor made of white distilled vinegar, salt, dillweed, essence of dill, and spices. About ten days is required for the pickles to absorb the liquor and spice. Barrels containing this variety of pickles must be turned every day to insure mixing of the liquor throughout the mass until the dill cure is complete. Likewise, if the curing is done in small tanks, the liquor must be circulated by pumping every day.

Sour pickles are handled in the same manner, except that in place of dill liquor, the liquor consists of white distilled vinegar of proper strength, together with the proper spicing. About ten days is required to complete the sour cure.

Sweet pickles are handled in the same manner as dills and sours, except that the sweet cure is an operation succeeding the sour cure. After the ten-day sour cure is complete, the remaining vinegar is discarded and allowed to run down the sewer. Sweet liquor is now put over the sour pickles, and allowed to remain for at least 30 days until the sweet cure is complete. Sweet liquor is made by dissolving sugar in 100-grain white distilled vinegar and then flavoring it with the proper spice oils. The effect of dissolving sugar in strong vinegar is to dilute it, so that its strength will decrease from 100-grain down to 34- to 36-grain in many sweet liquor formulas. A certain amount of heat and stirring is required to dissolve the sugar in the vinegar. In some plants where steam siphons are used for pumping vinegar, the condensation of the steam in the vinegar while pumping it into syrup tanks in upper floors is sufficient to produce the proper degree of heating to dissolve all of the sugar. Strictly speaking, the operation is one of warming rather than heating, because it is not desirable to heat the solution sufficiently to bring about inversion of the sucrose.

A seemingly inevitable element of waste occurs in the manufacture of sweet pickles when the spent liquor from the sour cure—the cure known among pickle men as "sours for sweets"—is thrown away. It appears to be inevitable because of these two facts: At present it is impossible to obtain vinegar conforming to legal standards in a more concentrated form than 110 to 115 grain (11.0 to 11.5 per cent acetic acid) strength; and second, because it is impossible to dissolve sugar in vinegar without diluting its strength. Until someone discovers a cheap method of concentrating vinegar which at the same time produces a concentrate conforming with federal standards, the two-stage method of making sweet pickles will continue to be in use. For those interested in the economic possibilities of a concentrated vinegar, it should be pointed out that this need can be met only by 160-grain or stronger vinegar.

In the case of sweet pickles, the longer the period of curing, up to two or three months, the better is the quality of the sweet pickles. This greater length of time for making the sweet cure is due to the effect of sugar. In the sweet liquor we have a solution with very high osmotic pressure, and the first effect on the sour-cure pickles is to cause them to shrivel to a mere fraction of their size a few hours before. After standing for a considerable period of time, the process of diffusion restores the pickles to their former appearance. This diffusion is accompanied by the penetration of the sugar through the skin of the pickles into the interior. Hastening of the sweet cure may be accomplished by rolling the

14,000 45-gal. barrels of dills are under cure at this Norwalk (Ohio) plant

Interior of the packing plant at Wiggins, Miss. Process tanks are shown in the right background

barrels one-half turn every day, which brings the heavy syrup at the bottom of the barrels to the top and allows it to trickle through the mass of pickles again.

Manufacture of genuine dill pickles, made from green pickles as they come from the field, is considered by some to be the most difficult process with which pickle packers have to contend. Usually, more loss is incurred in making genuine dills than the losses in the manufacture of all other kinds of pickles put together. The source of loss apparently is intimately tied up with our lack of true understanding of the chemistry of curing pickles. Curing of dills is properly described as a quick low-salt cure, resulting in a pickle delicate in keeping qualities.

Cucumbers intended for manufacture of dill pickles should be packed as soon as the first pickles of proper size are received at the plant, for the fresher the pickles, the less chance for spoilage. Only the larger sizes of pickles—that is, the No. 2 size, which run from 3 to 5 in. in length—are used for dills. When they are received they are first dumped into a special washing tank filled with fresh water to remove any soil or dirt. They should not be permitted to remain in the water any longer than is necessary to cleanse them thoroughly, for bacterial action which will cause softening of the skin may start.

The clean, washed, large-sized pickles are now placed in new 45-gal. barrels with the proper quantity of salt, in case the manufacturer is using the older process, or, where the newer method is being used, the salt is replaced by a brine solution of proper strength.

Details of this operation are as follows: A weighed quantity of salted dillweed, which has been previously cured in the same manner as salt stock, is placed in the barrel. Usually it is divided roughly into two parts, with one-half of it going into each end of the barrel. Next a requisite quantity of dill pickle spice, consisting of whole black pepper, allspice, cinnamon, mace, yellow mustard seed, and bay leaf, is added, or it may be reserved until the time of repacking. The head is put on the barrel, the hoops are tightened, the barrel is turned over on its side, and filled through the bunghole with a brine of 29-deg. salometer strength. The bung is then driven tight and the barrel placed in storage for the six weeks required for fermentation and cure.

It is desirable to cure the dills in the shade or in a cool place, but, unfortunately, there usually is very little natural shade in the vicinity of a pickle station, because the constant leakage of brine from tanks and drip from the various operations kills all trees within close proximity. The number of barrels of dills put up in a large salting station is sufficient to cover a considerable area of the yard, one or two thousand barrels being not uncommon. In general, however, it may be said that the barrels of dills are of better quality and yield when cured in the shade. This is due to the fact that the sunlight increases the temperature, and consequently both the rate of fermentation and rate of cure. Sometimes it is so rapid that sufficient gas is generated inside of the barrels to blow the head out. Gas formed by the fermentation ordinarily escapes by diffusion through the wood or by slow leakage through cracks in the barrel.

After the fermentation has ceased, the dills are ready for immediate use, except that they require sorting according to size, and repacking. The shrinkage in packing dill pickles is very large, owing to the "bloaters," or hollow pickles, that are frequently found, and also to the space required for the dillweed itself. For example, from ten 45-gal. barrels of original dills we seldom obtain more than eight full barrels on repacking. On account of the temporary keeping qualities of dill pickles, they should all be disposed of before May 1 of the year following their packing.

The question of "bloaters" is one that has perplexed pickle men for many years. A number of theories have been proposed to explain the hollow pickles, and one which has received more support than any other is that the phenomenon is caused by excessively rapid fermentation—that the gases caused by fermentation or respiration within the pickle cannot diffuse out of the pickles into the brine with sufficient rapidity, and therefore an internal rupture occurs.

Another theory now gaining considerable support appears to have common sense behind it. It is to the effect that bloaters are already in existence before fermentation is started. Considerable support for this idea can be gained by anyone who wishes to cut up a large number of green cucumbers of the size that is normally converted into dill pickles. It has been found by a few who have gone to this trouble that the percentage of hollow green pickles is about the same as we find in the repacking operation where dills are being repacked. If the latter theory is the correct one, then there is little that the pickle salter can do to prevent the formation of bloaters except to discover some method of removal of the hollow pickles before they are put into the brine.

Finished pickles of all types, whether they be sweets, sours, or dills, are sold in various sizes of containers, either glass, tin, or wood. As the final step is distinctly a packaging operation, it will not be discussed in this paper.

Outside of the pickle industry very little is known of the vast amount of capital that is invested in the manufacture of cucumber pickles. The normal crop of pickles in the United States is approximately 5,000,000 bu., which requires an investment of about $8,000,000 in raw material alone. To this sum must be added the carrying charges and all other expenses incidental to the manufacture. Moreover, unless a manufacturer is prepared to carry large inventories of salt stock of all sizes, he is always in a position where he must purchase some of the assorted sizes from others and pay a profit on the other man's operations, as well as take a speculative chance on the market.

MICRO-DISINTEGRATION

Application of Homogenizers and Colloid Mills in the Food Industries

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FINE subdivision in some products is a factor parallel in value to acidity, salinity, or sweetness, and in some cases so important that the last named (sweetness) is obscured unless the material has undergone mechanical disintegration. Other cases require disintegration in order to produce stability of particles in a liquid medium, besides bringing out flavor, palatability, and appearance. Still others require disintegration, in order to insure thorough mixing and uniformity, so that the finished material, after successive stages of manufacture, is homogeneous—i.e., the same at the top as at the bottom.

The early applications of micro-disintegration date back to about 1905, when the process was introduced for the emulsification of evaporated milk. Later, it was applied to other products allied with the dairy industry, where it was desired to prevent the fat from separating, forming stable emulsions. Still later micro-disintegration was applied to the ice cream industry in the manufacture of the "mix," thus developing a more homogeneous incorporation of fats, solids, flavor, and milk. In more recent years the application of micro-disintegration has emerged from the dairy and ice cream field, and its uses have been widely applied in other industries, particularly in the food and pharmaceutical line, where emulsions are produced on a commercial scale.

Applications of Process

The manufacturer of tomato products has encountered considerable difficulty with separation. In many instances it has been to the detriment of the product, as a watery upper layer has often been misconstrued as a spoiled product, due to the sedimentation of the tomato pulp. By micro-disintegration, the particles of pulp are sufficiently subdivided to form a stable suspension; and the pectins more evenly distributed, tending still further toward stability; enabling the product to withstand the heat of sterilization, cooling, and subsequent storage. Also the viscosity or consistency is considerably increased, insuring the manufacturer a more attractive product.

Micro-disintegration of tomato products is not a distinct process but merely a step or link in the general progress of the raw material to the finished product. It has been found that the best place for the disintegration of the tomato juice is immediately after the juice is extracted from the whole tomato, the product then assuming the regular course. In the hot break method of extracting the juice the disintegration should take place immediately following extraction. In the cold break method, it has been found that the best results of micro-disintegration were obtained if the juice was raised to 180 deg. F. before passing through the micro-disintegrator.

In the preparation of tomato cocktail, micro-disintegration of the composite product before filling tends to reduce separation during processing and storage. Also it is noted that the flavor is accentuated. A satisfactory procedure for cocktail preparation is to heat the entire mix, comprising all the ingredients, to 150 deg. F., then pass through a warm micro-disintegrator, fill, and sterilize. Although a small amount of sedimentation sometimes takes place, it is easily disturbed and suspends with light shaking.

In catsup manufacture micro-disintegration is a decided aid in producing a more smooth and homogeneous product, yet retaining the original characteristics of taste and color. The use of a micro-disintegrator has, to a great extent, prevented water separation occurring in the neck of the bottle and very materially reduced the water ring of the "blotter test." It has also been found that where a finished catsup lacked a good consistency, micro-disintegration of the extracted juice before any high or prolonged heating or concentrating produced a heavier body with permanent suspension. Also it is believed by some manufacturers that the disintegration of the pulp before concentration is an aid to dispelling the air in the boil.

In catsup manufacture, as well as with any of the other tomato products, it is desirable to disintegrate before the product has set—i.e., before the suspending properties of the tomato are weakened by heating, and it is possibly coagulated.

A criticism of the use of machines for the dispersion or disintegration of tomato products is that it incorporates air. Where large quantities of juice are made there is but little tendency to incorporate or increase the quantity of air by micro-disintegration. However, the breaking down of the cell walls, where air is incorporated, tends to increase foaming during the early part of the concentration period. This condition appears to be due to the incorporated air, though, in reality, it is caused by the more rapid liberation of imbedded air in the cells. A vacuum system in the line will quickly eliminate this condition, and possibly create a product in which barely any of the vitamins are destroyed. In many of the processes it has been found that most of the air comes off in the concentration or boil.

As with tomato products, the manufacturers of clam juice cocktails have experienced settling or sedimentation after sterilizing and storage. This is another case of proteins settling out after coagulation. Dispersion of the sterilized material has not been satisfactory, but where fresh juice was subjected to micro-disintegration before filling, thus minutely dispersing the protein, little separation took place. It is well, therefore, to disperse the proteins as soon as the juice is liberated from the clams.

A producer of creamed products has also benefited by the micro-disintegration of the ingredients making up the cream sauce. The homogeneity resulting from fine dispersion is hardly comparable with the original product. The ingredients are stirred together into the milk while heating to a temperature of 160 deg. F. and then dispersed mechanically. The viscosity of the sauce is ma-

terially increased and it remains homogeneous after mixing with the base material, processing or sterilizing, and during storage. Without disintegration of the sauce, the pack is curdled and presents a discouraging appearance, due to the heat of sterilization.

Another field in which micro-disintegration seemingly is adaptable is the baking industry, for the purpose of smoothing out the bread mix. Although this field has not been very favorable toward the idea of micro-disintegration, a few concerns are employing the process in preparing bread mix. In this process the water, sugar, shortening, and milk are warmed to 120 deg. F. and then dispersed, producing a very homogeneous mix, which creates a more uniform texture in the final product.

In cream cheese manufacture it has been found that a finer texture resulted in the final product if the original cream mixture was thoroughly dispersed before setting. Also a definite shortening of the process resulted in that there was less whey and it drained more rapidly. Some manufacturers even contend that the draining is unnecessary when the cream used is thoroughly disintegrated or emulsified.

In preparing syrups which include fruit flavors and added essential oils, the thorough micro-disintegration of the liquids is very beneficial in bringing out the flavor. The syrup, flavor, and added oil are first mixed together, and then passed through a disintegrator and filtered. The final syrup is free from signs of oil and uniform throughout, which makes for a uniform product in dispensing, with a stronger flavor.

Also clear syrups flavored with essential oil or oils are made by dispersing the oil thoroughly into the water phase by means of a disintegrator, then filtering or centrifuging. In this manner the flavor is imparted to the syrup corresponding to the solubility of the oil, and the excess removed, leaving a clear syrup. By disintegration in one of the various types of machines for this purpose, a great deal of time is saved that would ordinarily be used in stirring and filtering in order to impart the flavor.

Disintegrators are also applied to the making of purees, or concentrated soups, where the macerated materials contained in the puree are very thoroughly broken up and dispersed, either before or after cooking, depending on the coagulating of the proteins. In many cases the previously finely divided vegetable or meat products are mixed into the sauce or broth and the whole is then passed through a suitable disintegrator. The resulting product is uniform with all materials suspended, making for an ideal pack, with little or no separation during sterilization or storage.

Homogenizers

A brief description of the three types of machines mentioned herein follows:

The homogenizers consist essentially of a three- or six-cylinder high-pressure pump, according to the capacity, each cylinder possessing a suction and discharge valve capable of withstanding the pressure to which it might be subjected. In the discharge line is placed the homogenizing valve, the critical part of the machine, carefully ground into the seat and held closed by a suitable spring and screw mechanism.

The valve may be either of the stationary or rotating spindle type. In the former case the valve is set to open at the pressure required, depending on the desired results. The working pressures on this type are adjustable from 0 to 5,000 lb. per sq.in. pressure. When, during operating, the pressure reaches a point where the homogenizing valve opens, the space between the disk or valve and the seat is so narrow that the materials passing through are subdivided to such a degree that a new emulsion or suspension of remarkable stability results. Any desired pressure, according to the degree of subdivision required, can be obtained by regulating the handwheel attached to the screw of the valve mechanism.

In the rotating spindle type of homogenizing valve a stationary seat is held fast by suitable locking mechanism, and a spindle inserted, free to rotate and also to slide back and forth slightly in its bearings. A handwheel and screw mechanism pushes the spindle into the seat. During operation the spindle revolves continuously, and is fixed so that there is no possibility of retreating.

The difference between these two types of homogenizing valves is that the rotating type does not depend alone on a direct impinging force to break up the materials but also upon rolling and grinding them between fine clearances.

Colloid Mills

In general, the colloid mill consists essentially of a high-speed rotor operating in close proximity to a stator, or another rotor running in the reverse direction. The mill may be constructed with the rotor in either a horizontal or vertical plane. In effecting micro-dispersion, hydraulic shear forces are employed—i.e., a combination of shearing stresses and impact forces produce disintegration, while revolving blades leaving and reentering the spaces between adjacent fixed blades impart sufficient shock to the liquid in the film to disrupt and disperse the suspended matter. In fact, it might be said that the colloid mill depends on the shearing of a liquid film adhering with great tenacity to the relatively fast moving confining surfaces. These mills can be divided into two distinct classes or types:

1. Those in which liquid is propelled through the gap by centrifugal force acting upon the material forming the film. They are machines having the working surfaces in the form of disks or flattish truncated cones, diverging from the ingress end. This cone operates in very close clearance to the stationary disk. The film of liquid is delivered at the axis of rotation and, progressing toward the periphery, particles of liquid increase their radial velocity and find increased space, so that the liquid is shot through as a spray, thus producing emulsification or micro-disintegration by hydraulic shear.

2. Those in which the surfaces confining the film are so shaped that the film does not tend to evacuate the space of its own inertia, or in which it actually tries to work back to the feed space. In operation the material to be disintegrated tends to travel outward by centrifugal force, but is brought inward again and again by tangential grooves, until it is finally expelled by head pressure of material fed to the mill.

The super-mixer, another type of disintegrator, utilizes a medium high speed like the colloid mill, but dispenses with the necessity of fine clearances between the stator and rotor. In this machine micro-dispersion is produced by having the flow of liquid at right angles to the rotor, so, that, under the action of centrifugal force, it is reflected toward the foci of conical curves. Also considerable hydraulic force is employed with some film shearing produced by the rotor in the mixing chamber, thus producing good dispersion. This machine can be used also for the regular disintegration of rather large particles of more or less tough nature, such as beef or vegetable tissues, suspended in a liquid medium.

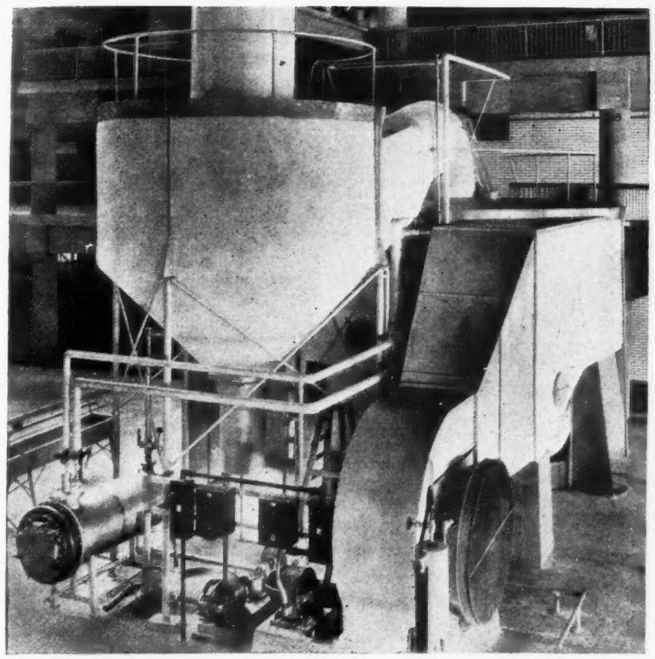


Fig. 1 — Liquid collector, heater, pump, and fan used in spray-drying yeast

Powdered Yeast Prepared by Spray Drying

By A. W. FARRALL
Director, Experiment Laboratory
Douthitt Engineering Co.
Chicago, Ill.

ANHEUSER-BUSCH CORP., of St. Louis, has recently completed the installation of a spray dryer (Fig. 1) for the commercial production of powdered yeast, corn derivatives, and certain other products. This is the first installation in this country for the spray drying of yeast on a commercial basis.

Yeast which is to be dried to a powder is taken after being compressed, mixed with water, and pumped directly to the spray dryer, where it may be handled in either one of two ways, depending upon the concentration of liquid. If a dilute liquor—say, 6 to 10 per cent solids—is to be dried, it goes first to the pre-concentrator, or liquid collector, and then through the dryer, as hereinafter described. If it is as heavy as can be atomized, 16 to 17 per cent solids, it is pumped directly to the drying chamber, and the liquid collector is used only as a powder economizer.

When dried, the yeast appears as a soft, light, cream-colored powder of 100 mesh or finer, and contains from 3 to 4 per cent moisture. In this form it keeps indefinitely, yet can be quickly put into suspension if desired.

The dryer, which is of the Gray-Jensen type, made by Douthitt Engineering Co., has a capacity of approximately 315 to 350 lb. of finished yeast powder per hour, uses 15,000 cu.ft. of air per minute, and has a drying chamber 18 ft. in diameter. The over-all space requirement for the installation is 24 ft. wide, 40 ft. high, and 40 ft. long. It consists essentially of five parts: the spray drying chamber, the liquid collector, the air heating chamber, the atomizing system, and the powder removing system. The regular method of operation, when drying liquids of low solids content, is as follows (see flow sheet, Fig. 3):

Cold air entering the main fan is blown through the steam-heated, aerofin coil chamber, where it is heated to a temperature of from 225 to 290 deg. F. It then passes to the wind box surrounding the top of the cone-shaped drying chamber. From there it enters the drying chamber and forms a cyclonic current, moving rapidly, spirally, downward toward the center, then up and out at the center of the top of the drying chamber. In passing through this chamber, the air comes in contact with the main spray of the finely atomized liquid and is cooled to a temperature of about 150 to 160 deg. F. by the evaporation of water. It is 50 to 60 per cent saturated when leaving the chamber.

After leaving the top of the drying chamber, the air is carried to the liquid collector, where it again forms a cyclonic current, comes in contact with a coarse spray of incoming liquid, and is exhausted at the top center in a practically saturated condition at a temperature of 110 to 125 deg. F. During this last treatment the liquid spray thoroughly washes the air so that practically all powder carried over by entrainment from the main drying chamber is picked up and returned to the system, giving practically a 100 per cent recovery of solids. It is evident that the treatment of the air is of such nature that it is exhausted in a nearly saturated condition, at low temperature and practically free from entrainment losses of either powder or liquid.

The path of the liquid leads from the storage tank through an elevating pump to the liquid collector, where a float valve automatically controls the level of liquid. In this collector the liquid is circulated by means of a pump, and after passing through a multiple-tube heater, is sprayed in a coarse rain inside the collector for the purpose already mentioned; namely, to reclaim waste heat from the drying chamber and to wash the outgoing air so that it is practically free from entrained powder particles. Considerable evaporation of liquid takes place in this part of the system, the amount depending largely upon the quantity of steam admitted to the heater in the collector circuit.

The concentrated liquid leaves the bottom of the liquid collector and passes to the hydraulic pump, which forces it under 2,000 to 4,000 lb. pressure into a high-pressure line leading to the single high-pressure atomizer, located in the center of the top of the main drying chamber.

Upon passing through the atomizer, the liquid appears in the form of a fine mist, and is caught up by the whirling heated air; this, together with the centrifugal force, carries it spirally outward to the walls of the drying chamber. The enormous surface exposed to the warm

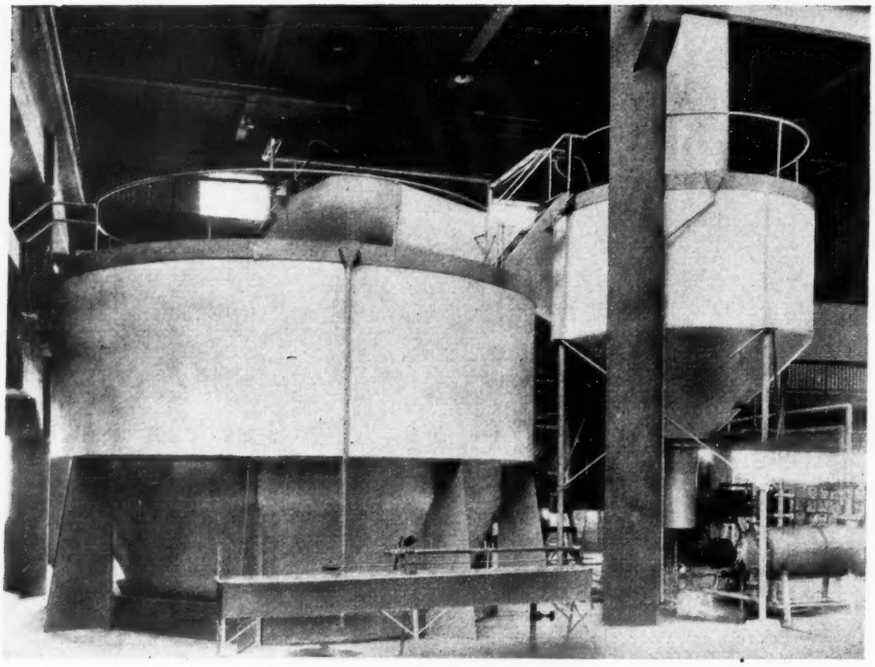


Fig. 2—Top of the spray-drying chamber used for drying yeast and recovering byproducts, with the liquid collector shown at the right also the duct for bringing heated air from the dryer into the top of the collector in order to separate out any dust that may be in the air

air results in almost instantaneous evaporation of moisture, leaving the solid matter in the form of a fine dry powder which strikes the side walls and slides down to the bottom of the drying chamber, where it is picked up by a pneumatic conveying system and deposited in the powder receiver. The whole time elapsed from the moment the liquid leaves the high-pressure pump until the dry powder is in the hopper is less than half a minute. At no time is there more than a few pounds of powder in the drying chamber.

A feature of the powder removing system is that it is a closed system, which operates continuously and allows no material to accumulate in the bottom of the drying chamber where it would be subject to prolonged heating. This is a very important point in the drying of many products which are heat-sensitive. The solubility of the finished product is oftentimes greatly improved by instant removal and cooling of the powder; also, with certain materials high in sugar, it is absolutely necessary to cool the powder and remove it at once in order to prevent caking and gumminess of the particles. Another feature of this part of the system is what is termed the "Ram's Horn." This device is a pneumatic conveyor and sifter, which automatically standardizes the powder and controls its density. It also serves to reduce the moisture content of the powder by from 1 to 2 per cent.

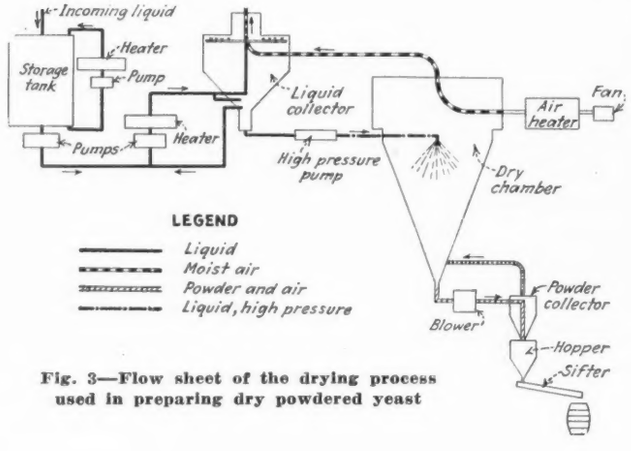


Fig. 3—Flow sheet of the drying process used in preparing dry powdered yeast

Provision is made in this dryer to apply refrigerated air, if necessary, to the powder conveying system, so that extremely rapid cooling can be accomplished by the attachment of certain auxiliary equipment.

The dryer is so constructed that liquids containing a high percentage of solids, or not needing pre-concentration, as yeast of 15 to 17 per cent solids, can be fed from the liquid storage tanks directly to the high-pressure pump without passing through the liquid collector. When operating in this manner, the liquid collector is used only to collect dust which would otherwise be lost by entrainment. The thermal efficiency of the dryer is highest when operating on liquids of low solids content, which allows the use of the liquid collector as an economizer and evaporator.

Power for the dryer is furnished by standard direct-current motors. A variable-speed motor is used to drive the high-pressure pump, in order to control the pressure on the atomizing system.

Heat for drying is furnished by steam at 125 lb. gage pressure, condensate being returned to the boilers. Aerofin type radiators are used throughout. Direct-fired gas heat can be used instead of steam, although in this particular instance, the greater uniformity of temperature, together with necessity for prevention of contamination of the product from flue gases, resulted in the selection of steam-heating equipment.

The labor requirements of the plant call for one operator who also looks after the bagging of the powder. Extra help sometimes is needed for standardizing solution and to prepare the liquid for drying.

The materials used in the construction of the dryer are principally "Allegheny" metal and heavy galvanized iron. "Allegheny" metal is used in the construction of the liquid collector in order to resist the corrosive action of sulphur dioxide present in certain of the liquids to be dried. All principal piping and valves are of the sanitary type similar to that used in the dairy industry. The large liquid heater used for maintaining the proper temperature in the liquid collector is of the multitube type, with a flexible expansion head on one end to relieve stresses due to unequal expansion of shell and tubes.

Special Motor Control For Creameries

By L. G. ALFORD
General Electric Co., Chicago, Ill.

THE usual arrangement of control used with small motors in creameries has been either to mount the starting device on the wall as near the machine as possible or to mount it somewhere on the machine itself in the place most available for conduit circuits. As a result, this equipment is in such a position that it receives the full quantity of hot water that is used (necessary to meet sanitary requirements) in washing the walls, machinery, and floors, and in addition is subject to condensation which collects on the walls and machinery and which runs down the conduit or forms on the metal inclosure.

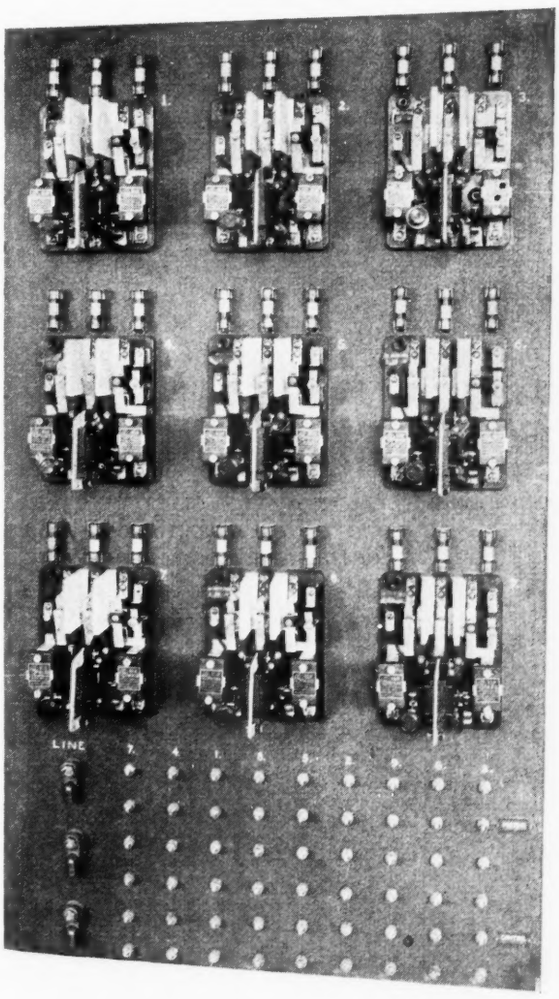
The natural result is that a standard sheet-metal inclosing case lasts but a short time, even though painted with some waterproofing paint at the time it is installed. In these plants, as a rule, there is no person interested in keeping such equipment in the best of condition, because any service needed is taken care of by some "handy man."

In an effort to solve this problem, one large company, for some of its new plants which are in process of construction, decided to group the individual motor starters that would be required for a particular lot of machinery in a fairly small area, and to place them inside a unit metal cabinet made of No. 10 gage Armco rust-resisting metal. The thought was that this arrangement in a cabinet could be easily located in some position that would not subject it to such severe operating conditions, and at the same time it was felt that the equipment, being of a larger size, would not be so easily overlooked. The push-button station for each starter is to be located at the machine or near the operator's position.

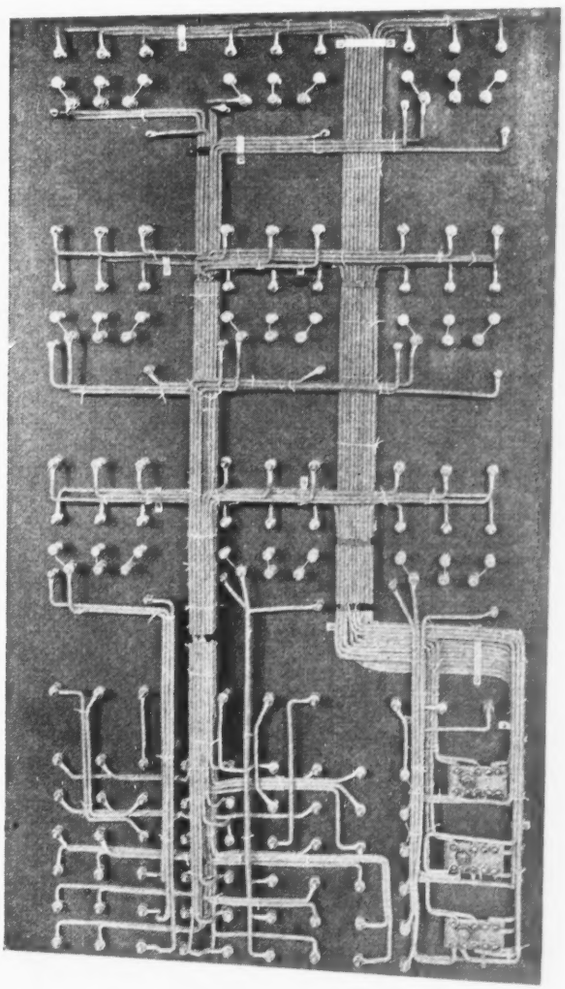
By referring to the illustrations it is apparent that the installation expense is at a minimum, because all of the conduit entrances into the panel box come in at the bottom and all of the connections that are necessary can be made on the front of the panel.

Closer inspection indicates that there is a cross-index between any individual switch and its terminal connections at the bottom of the panel, because each row of terminals is numbered to correspond with the number of the magnetic switch marked on the panel. The motor connections form the upper three contacts of each row and the three control circuits form the bottom terminals of each row.

Unit controlling nine magnetic switches, back-connected, with each motor circuit fused



Rear view of unit shown on left, showing how all connections are made on panel back



How the Hormel Plant Solved Its Sewage Problem

By A. E. ROBE
Chicago, Ill.

UNIQUE in the field of sewage disposal is a self-supporting plant developed and operated by the Geo. A. Hormel Co., of Austin, Minn., for the treatment and purification of its meat-packing wastes.

Methods ordinarily used for treating municipal sewage are impracticable for many industries, because of the peculiar nature of their wastes. The iron-acid pickle of steel mills and the phenolic liquors of gas works cannot be rectified by trickling filters or activated sludge plants. Sewage from creameries gives trouble because of its acidogenic tendency. These examples could be multiplied. Observations made by the Chicago Sanitary District bring to light a modern anomaly: the possible expediency of requiring manufacturers of bootleg beverages to space their waste discharges into municipal sewers rather than to overtax the facilities of the city disposal plant. The meat packer is among those who have peculiar problems if sewage treatment is required of him. His special problem is not so much qualitative as quantitative. His sewage would respond readily to the treatment given to municipal sewage, if it were not so very concentrated. Probably there is no other large industry which produces such concentrated wastes. Slaughter houses pour forth a product so high in organic matter that it contains ten times the pollutional strength of the average municipal sewage.

Hence the industry at Austin, contributing its 1,500,000 gal. a day to the little Cedar River, may be looked upon as equivalent to a city of 100,000 population. Tests indicated that the water of Cedar River was in almost as bad a condition as the undiluted and untreated sewage of some cities. The cost of a complete treatment of such a waste by ordinary methods would be enormous.

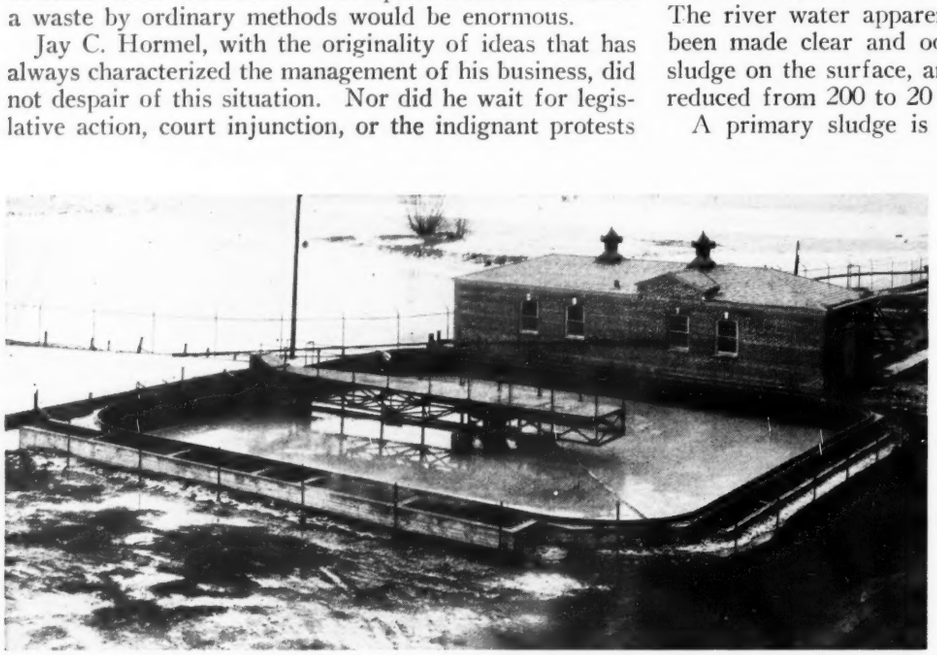
Jay C. Hormel, with the originality of ideas that has always characterized the management of his business, did not despair of this situation. Nor did he wait for legislative action, court injunction, or the indignant protests of his downstream neighbors. Of his own initiative he went to the University of Minnesota with a problem on his chest and money in his pocket. As a result, Dr. H. O. Halvorsen, professor of industrial bacteriology at the university, attacked the problem. With a startling disregard for tradition, he discarded as too expensive all the biological and chemical processes so extensively used. After a careful study of the problem, and many discouraging experiments, he succeeded with a method that had been reported by such authorities as F. W. Mohlman and L. H. Enslow as being ineffectual for packing-house sewage. This method was superchlorination.

While chlorine has been used for several years to sterilize effluents, and in recent times to stabilize raw or partly treated sewage, attention has always been focused on the resulting stability of the sewage, or the amount of oxidation. Halvorsen, however, noted that when sewage was supercharged with chlorine, it readily separated into two parts—a concentrated sediment and a clear liquid. The oxygen demand of this clear liquid, or effluent, was very small. And, most important, the sediment was half protein.

The ingenious scientist-engineer conferred with the hopeful business executive, and an experimental plant was built. Test runs extending over many months' time suggested several important modifications in design and operation which in general were successful. Finally, a plant capable of treating all of the sewage from the packing house was built and put into operation.

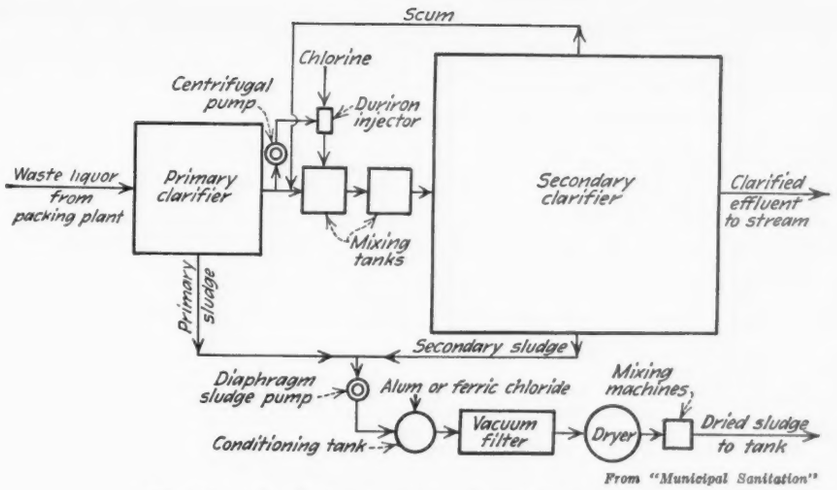
This plant treats 750,000 gal. a day (it was found expedient in the experimental work plant to cut the volume in half by eliminating certain unpolluted water). Five men and one ton of chlorine a day are the principal expenses. From the sewage is removed over 80 per cent of the organic nitrogen, over 98 per cent of the suspended solid matter, and over 80 per cent of the oxygen demand. The river water apparently is satisfactory, since it has been made clear and odorless; there is no longer any sludge on the surface, and the oxygen demand has been reduced from 200 to 20 parts per million.

A primary sludge is obtained by short-time settling



Raw sewage first enters the primary clarifier (behind building). The effluent is superchlorinated in a mixing chamber beneath the building, and passes to the secondary clarifier (foreground) for final settling

without chemical treatment. This sludge, when dried, amounts to two tons a day and contains 7.5 to 8.5 per cent ammonia. The secondary sludge, obtained by the superchlorination process, averages three tons a day, with 8.5 to 9.5 per cent ammonia. The Hormel organization estimates that the protein content of the mixed sludge gives it a value of $20 a ton for fertilizer, or $30 a ton for feed. If it can all be sold for feed at the price named, the expenses of sewage treatment, including interest, depreciation, and upkeep on the plant, will be paid by the revenue from the sludge. It is even anticipated that certain contemplated refinements in operation will so reduce the costs as to make the process profitable.



Flow sheet of the plant for treating packing-house wastes

In regard to fertilizer value, critics have said that the chlorine-protein compounds may resist decomposition by the soil fungi, thus delaying their availability as plant nutrients. Moreover, it has been found in feeding experiments with rats that the dry sludge shows some toxicity to these test animals. The Austin people explain that this toxicity is caused by rancid fats, and that experiments are being made on the extraction of these fats. The expense of this proposed extraction has not been estimated, and the value of the extracted fat is problematical. For obvious reasons, very little of the sludge accumulated by this process has as yet been sold.

Further possible objections are that if sale as a feed is contemplated, sewage from toilets must be diverted. Also it has seemed necessary to prevent contents of beef stomachs and similar materials from entering the sewer if a high ammonia value in the sludge is to be obtained. Similarly, curing pickle solutions, being high in salt, saltpeter, and sugar, must be diverted. The cost of disposing of these items has not been announced.

The principal mechanical features of the process are a primary (Dorr) clarifier, large enough for one-half hour detention, two chlorine mixing tanks in which the sewage is dosed with chlorine and agitated for twenty minutes, and a second clarifier for three hours' detention of the chlorine-charged sewage. From the bottoms of the clarifiers sludge goes immediately to filters and dryers, while from the surface of the second tank a rising scum is automatically skimmed off and returned through the mixing tanks.

While the salability of the sludge obtained from this method is still doubtful, and there are some items of waste which must be disposed of in some other way, the method has much to commend it. It gives an effluent comparable to that obtained by efficient complete treatments of other types. The treatment plant is said to be free from objectionable odors.

Although only limited data are available on the cost of treating packing-house sewage, it appears that the cost of the chlorine treatment may not be much greater than biological treatment, even if the sludge cannot be sold. And if the sludge can be sold, even at a low price, the process will be put on an economic basis outstanding in sewage disposal practice.

▲ ▲ ▲

If Brine Corrodes Your Refrigerated Truck

A GOOD many operators from time to time experience more or less dire results from the leakage of salt water over the chassis and running gear of their refrigerator trucks. Although seemingly insignificant at first, this steady drip of salt water upon unprotected metal parts can often cause irreparable damage to valuable equipment. This same agent was once a foremost factor in the depreciation of ocean-going vessels, playing an enormous part in the destruction of the steel hulls long before the ships had otherwise outlived their usefulness. However, brine corrosion no longer is a necessary evil. If it were feasible to introduce a quantity of copper into the metal used on a truck chassis, there would be little to fear of the action of brine upon it; but such does not happen to be the case. A copper element has, however, been infused into certain paints which, if properly used, will give maximum protection to any metal surface which might be exposed to corrosion.

In the first place, faulty refrigerator drainage is the shortest cut to trouble. New trucks have been known to be severely affected in the short period of 90 days after being put in operation. In these cases, even the new bodies might have been at fault, through failure of the drain facilities to do their part in preventing the waste from seeping through onto the metal parts.

In guarding against this condition, then, proper drainage should be the first step. Leaking brine tanks should be made tight, drain pipes checked for possible stoppage, all flanges and connections securely soldered. In attending to the chassis, if there has been any previous corrosion the rust should be removed by scraping and with a wire brush. When the clean metal has been washed with water and allowed to dry, it should be given two coats of salt-water paint, commonly known as copper paint. In obtaining this paint, care should be taken to specify the salt-water kind, as there also is a type for fresh-water marine use. Thus painted, the metal parts will be unaffected by whatever brine might later come in contact with them, and the truck better able to render a normal period of service.

Why Package Designs Fail in Production

By FRANCIS CHILSON
Consulting Production Engineer
New York, N. Y.

The simple lines of the catsup bottle give it a modern appearance, and the conical shape lowers the center of gravity. The wide mouth makes it easy to pour. Small plain jars, such as that on the left, are easy to handle

THE food industries undoubtedly are becoming more "package conscious." Judged by some of the newer designs, however, they are now duplicating many of the mistakes made by other groups in translating this consciousness into action.

There are a number of definite, incontestable reasons why packages have failed—and are failing. In the first place, a well-designed package must correlate harmoniously the interests of four groups: plant managers, sales or advertising managers, retail dealers, and consumers. Wherever a package has failed, the reason may always be traced back to a lack of consideration for one or the other of these groups.

If the plant manager is permitted to have undivided responsibility in selecting the new package, he will almost invariably put most of the emphasis only upon the cost of the packaging materials and the production costs which their use determines. His interests naturally lie within the plant, and his aim, therefore, will be to select a suitable package from a "within-the-plant" standpoint. Artistically, the result is almost sure to be ugliness—as most of the food packages now on the market demonstrate quite convincingly. If any generalization could be made as to the reason for the inferior design of food packages it would be that, as a rule, they have been selected, and even designed, by plant managers.

If, on the other hand, the sales or advertising manager is left to his own devices, he will invariably select designs which are impractical from a production standpoint. If he feels that a package is "different," that it has "pulling power," nothing can be too bizarre or impractical in his eyes. Usually the sales executive will consider the convenience and tastes of the consumer; sometimes he will consider the convenience of the dealer; but from the number of failures recorded, it may safely be said that he will never consider the interests of the plant manager. In one case, for example (FOOD INDUSTRIES, Vol. 2, p. 283), a bottle designed by an advertising man would not even stand up in traveling on a conveyor. It had to be placed in a cut-down tin can to hold it upright while being filled, capped, and labeled. This instance is by no means an isolated one; on the whole, there probably is some ground for the average plant manager's irate opinion that artists and advertising men are largely crazy.

Yet artists who, accepting the necessary production limitations, can apply the psychology of color and design, and its potency in arousing the desire to buy, ought not to be hampered in their own field. Perhaps the consumer appeal created by appearance of a package cannot be determined so scientifically as the center of gravity of a bottle, yet both are problems in which expert judgment must take precedence. The plant manager's individual preference for ornate lettering ought to have no more weight than the advertising man's individual preference for bottles that tip over on the conveyor.

Although the dealer has no direct voice in the selection or design of the package, his criticism of other packages which he has handled should be met. He wants packages that stack well—packages that do not require too much shelf space. He wants appealing packages, because he knows they sell quickest. He wants packages that do not fade or discolor on standing, that are substantial enough to withstand handling by customers and by delivery boys. Packages that finger-mark too easily, that gather and show dust, that become broken or damaged with handling, will inevitably be relegated to lower shelves or to the back room.

Packages have been purposely designed so that they would not stack well and would require an unusual amount of shelf space, on the theory that this extra amount of space would enhance display value. Practice showed, however, that the dealer left the goods in the back room and sold them only on call. Shelf space in the modern store is too valuable to allocate very much of it to any one of innumerable products. A recent estimate shows that the average chain grocery store carries 1,800 different items.

Finally, the interests and convenience of the ultimate consumer require something more than the appeal of the package to her. The package should be constructed so that it is easy to open, and, if not entirely consumed,

so that it can be resealed without danger of deterioration of the goods. Another point—and one too frequently overlooked—is package identity. The package should not lose its identity after it has been opened. Modern merchandising has increased the number of package products that every housewife must carry in stock (a survey made by the writer indicates that 75 different products are carried in the average kitchen cupboard), and in this heterogeny, the package that is not easy to find is likely to impair good will.

The design of a new package begins with the selection of the proper material of which the container is to be made. This is never the function of the designer; it is the duty of the plant chemist or the individual whose knowledge of the chemical action of the product on the container and of the container on it, and of the sealing requirements of the product itself, will enable him to specify the materials on a strictly scientific basis.

The selection of the proper seal also is a technical function. Since not all the standard closures on the market are of uniform efficiency, the chemist should be permitted not only to decide upon the type of closure but the actual closure itself. Many manufacturers of metal, desiring to get new outlets for their product, enter the cap field with unproved types of caps. One food manufacturer, for instance, tried a new form of lug cap, desirable from an appearance standpoint, which apparently sealed well. Only when returns began to inundate him did he discover that the cap actually did not seal hermetically, as had been claimed for it; that the lugs forced the skirt of the cap outward, umbrella-fashion, as pressure was applied, so that instead of pulling down on the liner the cap merely spread itself. There are so many good standard caps available that there is no real reason for experimenting with the new and untried types unless the plant chemist, after adequate testing, is willing to stand responsible for the experiment.

One of the virtues, from a production standpoint, of packing in cans lies in the fact that the relatively few shapes in which metal can be formed economically are, as a general rule, good production shapes. Glass, on the other hand, can be molded into any shape; and hence designs that have not been approved by production men are almost certain to cause trouble. At present, there appears to be a tendency toward crystal shapes embodying many corners and crevices. When glass is being blown, it must flow into all these corners; and this flow is never uniform. Hence, many containers of this type have one or more corners that are weak and will crack easily. In designing glass containers, the outlines should be made as simple as possible and free from sharp projections, filigrees, and bold reliefs.

A manufacturer of jelly recently discovered that he must change his new package again, as breakage of the present diamond-shaped container is tremendous both in the plant and out of it. A packer of syrup adopted for a short time a container that resembled the bottom of an oil can with a short spout. First, he discovered that it was impossible to label it automatically; then consumers rebelled against it, for the reason that its neck was too short to pour well, and because the bottle was difficult to hold in one hand.

Failure to allow sufficient space for the label is another error frequently made in the design of glass containers. Very often, too, the label space is made slightly convex or concave—both difficult to label smoothly. The space upon which the label is to be applied should be flat, or curved in one direction only. On panel bottles, a margin of at least $\frac{1}{8}$ in. should surround the label. A well-known brand of catsup is marketed in a bottle with a neck not only tapered but curved as well. This makes it impossible to apply the neck label by machine. The labels must be soaked in adhesive and stretched on by hand. If that company knew its item costs, the chances are it would realize that little if any profit is made on that item.

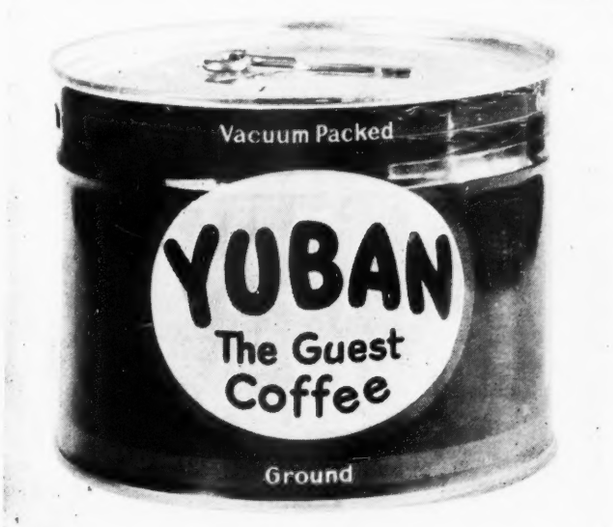
A salad dressing bottle was recently sent to the writer by a well-known Chicago firm for suggestions and criticism on the new design. The bottle had a straight neck and tapered sides, upon which was applied an oval label. The label was too large and not the right shape for the surface on which it had to lay. The result was that it was wrinkled and its edges were frayed from the action of the labeling machine wipers. Tapered bottles are not particularly easy to label at high speed, especially when the labels are not of the proper crescent shape.

This bottle, however, tapered from the heel toward the neck and not from the shoulder toward the heel; and this fact gave it a good firm base. Conical and tapered bottles should have their bases at the bottom and not at the shoulder, as is so often the case. The center of gravity of the bottle should be near the bottom. A well-known tomato-juice cocktail violates this principle, and it may safely be assumed that difficulty is experienced in handling it in production. Glass containers with peculiar projections may touch each other going into capping or other processing equipment, and have a tendency to turn out of line in such a manner that they become jammed in the runways.

Labels are the bane of nearly every production man's existence, whether he handles glass, tin, fiber, or chipboard containers. It requires a long and patient search in any food store to discover products with labels artistically designed and neatly applied. Some labels, particularly the wrap-around variety on cans and on fiber drums, look especially unattractive from the rear.

Label designers are likely to forget that when a series of horizontal lines are incorporated in the label design, it will be impossible to match them up when the labels are applied by machinery, nor do they realize that the weight, grain, and quality of the paper play very impor-

There are no useless decorations on this lithographed label to detract from its easy readability and atmosphere of good taste. The rich brown color suggests good coffee



tant rôles. Equally important are the nature and distribution of embossing, and the printing inks used.

The best kind of stock for machine labels is a short-grained supercalendered stock of from 50 to 55 lb. This will take printing well, and will not absorb the glue so quickly as to cause puckering, but is soft enough not to spring back from the container when first applied. Stocks under 50 lb. will absorb the glue so quickly that they will tear in the application of the labels. Stocks in excess of 55 lb., particularly if clay coated, will be so resilient that they will spring back from the container before the glue has a chance to set. The grain of label stock should always run in the direction of the stress—that is, across the label or with the printing. This is particularly true of labels that cover the lids and that must be shrunk to the size of the body of the container, such as those on baking powder and cocoa cans, and salt drums. Paper shrinks with the grain; and if it runs in the wrong direction, the labels will split. Moreover, paper tends to curl with the grain; consequently it is important on panel labels that the grain be horizontal instead of vertical.

Many of the poor labeling jobs one sees are due to embossing. A well-known brand of peas has an embossed design in the center where it is bound to cause a hump in the label packs and so retard labeling by machinery. Often one sees embossing confined to the center of the label, particularly on the neckbands of liquid condiments. When embossing is not distributed all over the surface of the label, it has a tendency to form humps in the packs, which keep the label from being drawn down evenly by the picker plates, and tends also to lock the labels together so that they will resist drawing down at all. Embossing should be avoided in the design of labels if possible. But if not possible, it should be distributed evenly over the entire label; it should be made shallow, with rounded edges, and of stock not in excess of 60 lb.

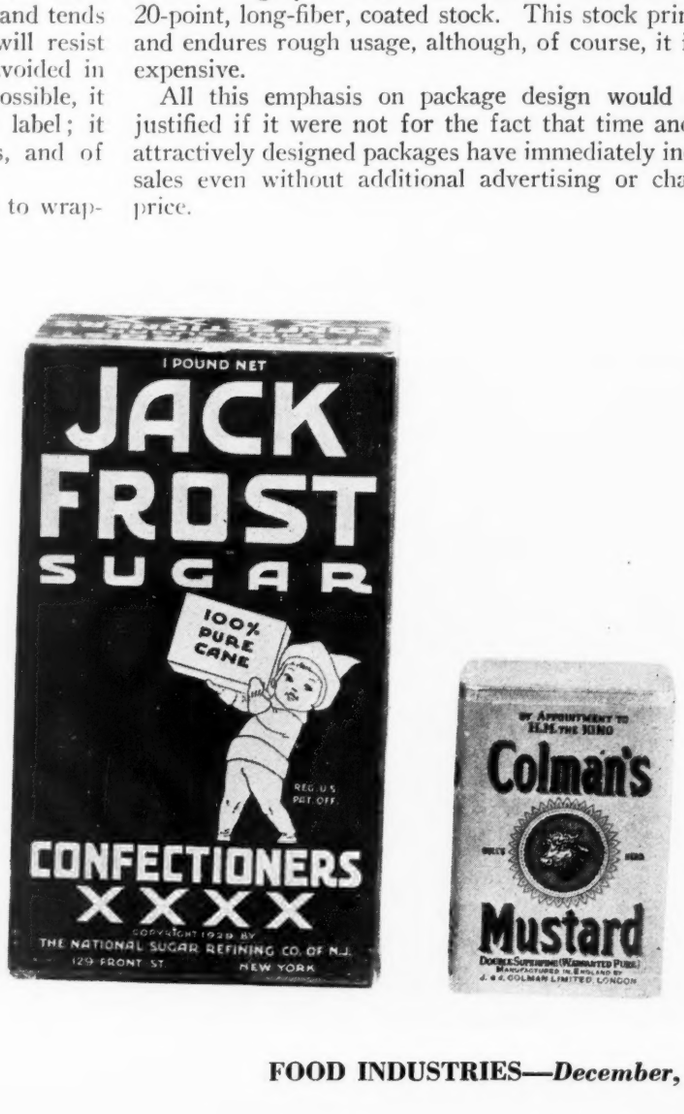
What has been said of labels applies as well to wrappers for cereal and other tight-wrapped packages. Such wrappers are glued all over and shrunk on; consequently it is important that the stock be not over 60 lb. and that the grain run in the direction of the stress. Wrappers for loose-wrapped cracker packages and those for bundles containing several packages of crackers permit more leeway, because the wrappers are not glued all over and are not subject to strain in application. Nevertheless, when coated stocks are employed they should not weigh over 75 lb., although wrappers for bundles may run as high as 90 lb. without impeding production. In the design of wrappers it is important to see that none of the lithography runs over on the flaps and edges that are to be glued, because glue will not stick well to printed surfaces of this kind.

The greatest advances in package design in the food industries have been in connection with what is called the tight-wrapped package used for cereals. Such packages are not only much stronger than ordinary cartons but are insect-proof. It has been possible to make very great strides in the design of these packages for the reason that the wrappers, being supercalendered stock, take lithography beautifully and are subject to none of the limitations imposed upon carton stocks.

Uninterrupted operation depends upon accuracy in the cutting of the wrappers and in the cutting and scoring of the chipboard shells. Both wrappers and shell blanks should be die-cut and the blanks should be carefully scored. The glued seam on these blanks should be straight, free from beads of surplus glue, and not more than $\frac{1}{16}$ in. away from the scoring. It should be remembered that the continuity of machine operation depends more upon the accuracy with which the shells and the wrappers are made than upon any other condition.

One of the reasons why ordinary cartons do not stand out more conspicuously on display is the fact that the cheapest of news back patent finish stock is employed in their construction. This type of stock does not take printing inks well and, being more or less spongy, it does not withstand handling. A great improvement is possible in this category if food manufacturers will use a 16- or 20-point, long-fiber, coated stock. This stock prints well and endures rough usage, although, of course, it is more expensive.

All this emphasis on package design would not be justified if it were not for the fact that time and again attractively designed packages have immediately increased sales even without additional advertising or change in price.



The "family similarity" of the Jack Frost sugar cartons is a decided merchandising asset. The bright yellow label on the mustard tin, like the brown coffee label, gains a psychological advantage by correlating product and package color

What You Should Know To Select a Pump

By G. W. CRAMER
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THE purpose of this article is to acquaint the reader with the different types of pumps, their characteristics and their field of usefulness; and to suggest what data he should have available when asking a pump manufacturer to give him a quotation on a pump for a certain job.

Unless the source of supply be a deep well or an artesian well, any one of three types might be used satisfactorily, depending on the individual requirements of the installation. These three types are the reciprocating, centrifugal, and rotary pumps. For deep-well service, either a pumping head or deep-well centrifugal must be used; or in some cases it might be advisable to use an air lift system. Most installations, however, will require one of the three types just mentioned.

The operating principle of the reciprocating pump is very simple. It is illustrated by the accompanying drawings, Figs. 1 and 2, which show the pump in two phases of its operation. As the crankshaft is turned, the plunger is moved into and out of the cylinder with a reciprocating motion.

We have used as our illustration the simplest form of a reciprocating pump, the single-cylinder, single-acting type. In practice, the two most commonly used types are the single-cylinder double-acting piston type and the single-acting triplex pump, which is simply three single-cylinder pumps combined into one machine.

The reciprocating pump is essentially a slow speed machine, running below 100 r.p.m. for pumps of considerable capacity. Gears supplied as part of the pump raise the speed required for driving up to 200 to 500 r.p.m. This class of pump may be driven by belt, electric motor, steam engine, or internal combustion engine. It is not suitable for use with a steam turbine, on account of the high turbine speed. When used with an electric motor, a gear reduction is necessary if an inexpensive, high-speed motor is supplied.

The discharge of a reciprocating pump is not steady, so the power required of the driver pulsates also. Since any motor or engine works to best advantage with a steady load, some flexibility between the two machines is desirable. A belt drive is ideal for this. Of course, there are many places where a belt is not suitable. The gear drive or direct connection may then be used with satisfactory operation, but a gear drive will cause some noise and the direct-connected driver must be designed to take care of the pulsating load, which often necessitates heavier shaft or couplings. In any event, the machines must be securely bolted to a good foundation and kept in alignment.

A motor of high starting torque is required for this type of pump. It requires full load as soon as the machine comes to full speed, about half load at half speed, and thus in proportion. When an internal combustion engine is used, either a clutch should be used between the engine and the pump or a bypass valve connecting suction and discharge chambers should be opened. When an electric motor is used for starting under full load, a compound-wound direct-current motor or a slip-ring type of induction alternating-current motor is used in the larger sizes. In the smaller sizes, or if the pump is fitted with an unloading device, such as a bypass, a clutch or valve tripper, a shunt-wound direct-current motor, or a squirrel-cage alternating-current motor may be used. The synchronous motor is the only one likely to require any special consideration. In buying such a motor, it should be stated that a reciprocating pump is to be driven and the motor manufacturer will then supply a motor with high starting and pull-in torque.

The head delivered by a reciprocating pump is whatever is required to push the liquid. At each stroke of the plunger, a volume of liquid equal to the displacement of the plunger is forced out and the pressure will be just sufficient to do this. If the discharge pipe is choked or a valve closed, the pressure will continue to increase until the pipe bursts or something else gives way. Where there is a likelihood of a stoppage in the discharge line, a relief, bypass, or unloading valve should be installed, which opens at any undue increase in discharge pressure and permits the liquid to flow back to the suction. Such a valve should not be regarded as a sure protection. When used only once in a while, it may stick and not work when needed. Such a device also protects the motor or engine driving the pump by preventing overload.

The discharge of a reciprocating pump of a definite size depends only upon the speed. Every revolution means a definite quantity of liquid pumped. The only way to change the discharge is to change the speed. This feature is very desirable in any applications where the discharge must be maintained even though conditions in the discharge line change. Since the discharge is variable, as already explained, pressure surges sometimes are set up in a long discharge line which leads to tremendous thumps in the pipe, due to sudden and violent increases in pressure. For this reason, most reciprocating pumps are supplied with an air chamber on the discharge side which irons out these pressure surges by changing the air volume in the air chamber, compressing it and expanding it as required. Such an air chamber sometimes is necessary on the suction line as well.

A reciprocating pump is best adapted to the smaller discharges, up to about 200 or 300 g.p.m. and particularly for higher heads. With low heads and large capacities, the centrifugal pump is to be preferred.

The reciprocating pump is adapted to many pumping services where high efficiency is required when handling small capacities against relatively high pressures. It is also very well suited for larger capacities against high pressures where sustained efficiency and long life are demanded when handling liquids containing small quantities of sand or abrasive material; and for installations where intermittent but reliable automatic operation is essential when pumps operate a suction lift, as this type of pump will pick up its suction without priming. Priming is necessary only when the pump is put in operation for the first time.

The name "centrifugal pump" comes from the force

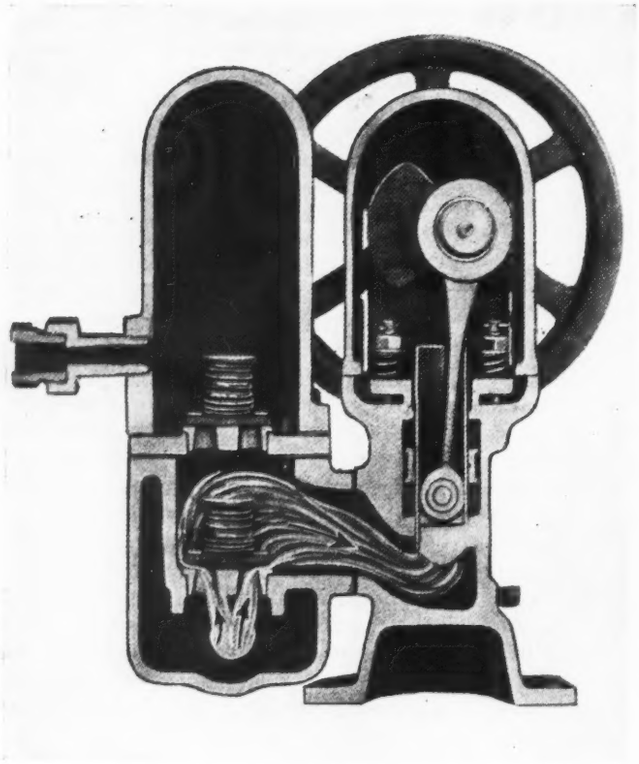


Fig. 1—Suction stroke of a simple reciprocating pump

which is exerted by a body moving in a circular path—or the centrifugal force. In the pump, the liquid is forced to revolve and therefore exerts a centrifugal force on the liquid in the case around the revolving impeller which is equal to the discharge pressure. The centrifugal pump consists of a suction pipe connection (Fig. 3) which leads the liquid into the "eye" of the rotating impeller. The impeller has curved vanes which direct the liquid from the "eye" to the discharge edge, moving the liquid in a spiral path as the impeller revolves, and the liquid moves toward the discharge edge. The liquid then enters the case, where it is collected from all around the impeller and led to the discharge connection. The head which a centrifugal pump will work against is mainly a question of the diameter of the impeller and its r.p.m., but can be varied by the designer to suit any individual service.

For purposes of illustration, Fig. 3 shows the simplest type of centrifugal pump—the single-suction, single-stage, open-impeller pump. In the double-suction centrifugal, a very common form of centrifugal pump, the impeller is inclosed—that is, it has two sides instead of one, as shown. For discharge pressures higher than can be obtained with a single-stage pump, multi-stage pumps are used.

The centrifugal pump is essentially a high-speed machine. It is suitable for direct connection to any electric motor up to 3,600 r.p.m., or to a steam turbine.

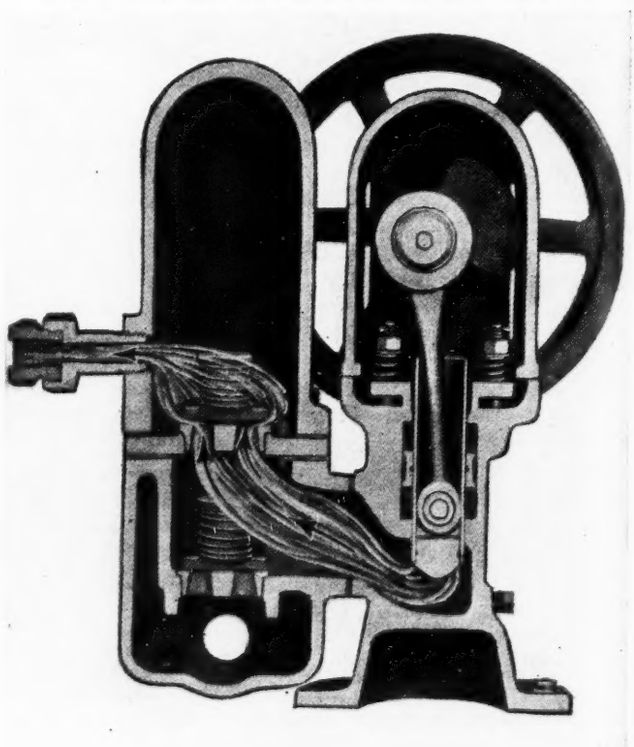
The centrifugal pump may be driven by belt, electric motor, or steam turbine, but usually is direct-connected, for which it is particularly well adapted. It is a compact, simple machine, much lighter and less expensive than the reciprocating pump in those cases where they can be compared for the same service. With the steady load and power demand of a centrifugal pump and the absence of reciprocating parts, a centrifugal pump can be practically noiseless in operation and there is no vibration. It is one of the easiest duties for motor or engine. Because of light weight and lack of vibration, a comparatively small foundation will do. In starting a centrifugal pump, a valve in the discharge pipe should be closed. The load required to start is then reduced to 25 to 50 per cent of full load, which makes it much easier to bring up to speed with any kind of motor or engine.

The head delivered by a centrifugal pump depends very largely on the speed, but also on the discharge. When the flow of water from a centrifugal pump is reduced or stopped by a valve in the discharge line, the head or pressure does not go up indefinitely, as in a reciprocating pump. It goes to a value which is limited by the design of the pump, as already explained, and well within the strength of any piping or other parts of the installation. No relief, bypass, or unloading valve is required.

The discharge of a centrifugal pump is fixed by the speed and the design and not by the service.

With the rotary pump, there are two cams or gears meshed together and revolving in opposite directions, as shown in Fig. 4. The case surrounding these cams is a close fit on the ends of the teeth and also on the sides. Any liquid which fills the space between two teeth of the cams must follow along with them as they revolve. In the part where the two cams mesh, there is but little space for liquid and that which was drawn through must pass on into the discharge pipe. As each space comes down the center and the cams separate, liquid flows into it from the suction pipe. With the number of teeth on the cams usually used, this sequence of operations is practically continuous, some spaces carrying liquid to the discharge pipe and some spaces filling from the suction pipe. The action is positive; each revolution transfers a quantity of liquid from suction to discharge, which depends upon the size and the shape of the cam teeth. There are no valves with a rotary pump. Therefore, it is better adapted to handling viscous liquids which cause large friction losses in passing through the restricted openings in the valves of a reciprocating pump.

Fig. 2—Discharge stroke of a single reciprocating pump



In many respects the rotary pump characteristics resemble those of the reciprocating pump. It is a positive discharge pump, with a definite displacement of liquid for each revolution of the gears. Its use is limited to the smaller sizes, up to about 500 g.p.m. and 230 ft. head. The discharge, however, is almost at a uniform rate, the pulsations being much less than in a reciprocating pump and approaching the centrifugal pump in this respect. The construction is very simple, which is an important point in its maintenance. It is peculiarly adapted to handling any liquid which has some lubricating qualities. Generally speaking, it is not suitable for water supply service unless the water is entirely free from grit or abrasive material. Belt, chain, or gear drive may be used. Speeds up to 500 or 800 r.p.m. may be used, but speeds of not over 400 r.p.m. are better practice where quiet operation and freedom from wear are desired. On account of the small sizes in which it is used, there is no trouble in starting a rotary pump. It does not require full load to bring it up to speed.

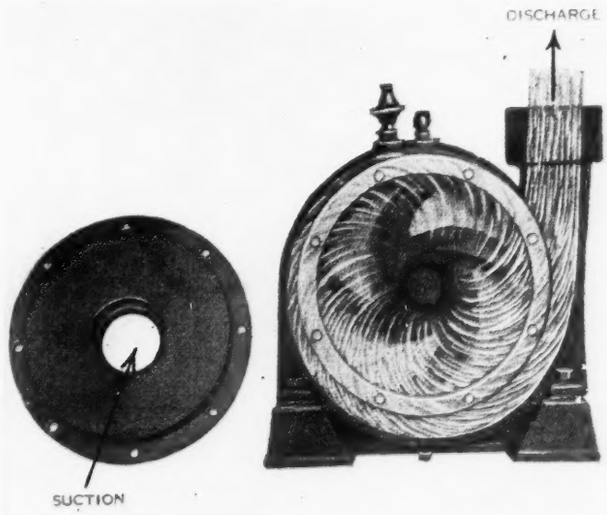
In the usual case, the discharge of a pump to be purchased is definitely known. The steadiness of flow is a factor which must be known. Does the demand vary, and between what limits? For instance, if the demand for the liquid drops off and a valve in the discharge line is partly closed, there must be means at the pump, if a reciprocating or rotary pump is used, to prevent the building up of a destructive pressure. A bypass regulated by pressure, or some other device, must be included in the installation. A centrifugal pump needs no protection like this.

The total net head against which a reciprocating pump operates is the sum of three things: static (i.e., vertical distance or elevation in feet from center of the pump to the highest point in the discharge line); friction loss in discharge piping; and pressure required at the end of the discharge line.

The total head for a centrifugal pump is the same as for a reciprocating pump, except that the total net suction lift is always included. For this type of pump four things make up the total head: static head; friction loss in discharge piping; pressure required at the end of the discharge line; and total net suction lift.

Any comparison of types of pumps must include the following considerations: cost, including the drive; service; and dependability. As far as cost goes, in those cases where either the reciprocating or centrifugal pump can be used, the latter will invariably be less expensive, except for very high heads and small capacities. These have fewer parts and are smaller, because of the higher speeds, and the higher speed ordinarily means a less expensive motor or other drive. The rotary pump is suitable in the smaller capacities and higher heads where the centrifugal is not so well suited. The rotary will be less expensive than an equivalent reciprocating pump.

Fig. 3—The action of a centrifugal pump is made clearer by a sketch like this than by any amount of explanation



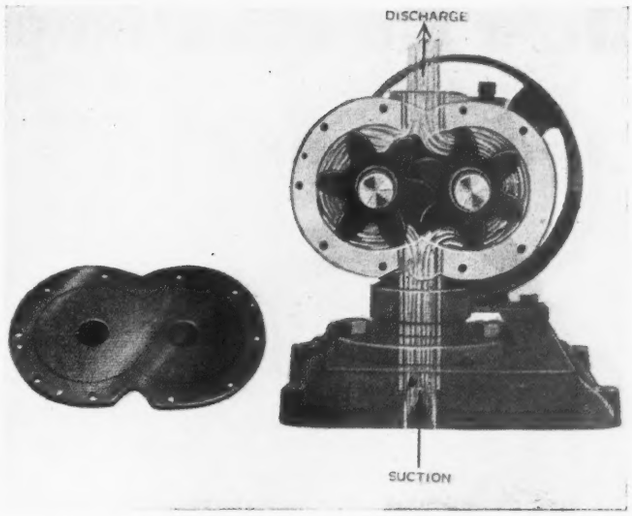


Fig. 4—Rotary, gear, and positive displacement pumps operate as shown by this drawing

Where the discharge rate must be maintained constant even though the head changes considerably, as is sometimes the case, the reciprocating or rotary pump should be chosen, unless the head is low. The discharge of a centrifugal pump changes as the head changes, an increased head causing a decreased discharge, and vice versa. When the discharge must be changed or even shut off, the complications added through the addition of a relief or bypass valve to a reciprocating pump make the use of a centrifugal pump desirable. Where capacity must be varied within wide limits, a variable-speed drive should be used with any pump if a good efficiency is to be maintained. With a reciprocating or rotary pump, this is the only way to change the capacity.

A reciprocating or rotary pump will operate successfully with a higher suction lift than a centrifugal.

The selection and application of a pump in many cases involves the study of many factors with which only an experienced pump man will be familiar. However, in most cases if the following factors are accurately determined, the selection may readily be made:

1. *Liquid to Be Pumped.* Usually water, but in many cases in the manufacture of food products, it will be such liquids as syrups, fruit juices, milk, soup, etc.

2. *Suction Lift.* This includes the vertical distance between the surface of the liquid to be pumped and the inlet of the pump, and the friction of the liquid in the suction pipe.

3. *Discharge Head.* This is made up of three factors: the static head (that is, the vertical distance the liquid is to be raised); the pressure required at the point of discharge; and the pipe friction. Pipe friction for water can be easily obtained from friction tables found in any handbook and in many pump manufacturers' catalogs. For liquids other than water, the user should obtain the advice of a pump engineer.

4. *Capacity required* in gallons per minute.

Just How Antiseptic Are Spices?*

By LAWRENCE H. JAMES†
Food Research Division
Bureau of Chemistry and Soils
U. S. Department of Agriculture

SEVERAL investigators have found that the essential oils derived from spices exert a marked preservative effect when added to food products. There thus arises the natural question, "What antiseptic power have the spices themselves?"

Our tests of the antiseptic action of mustard, cinnamon, and cloves against the growth of *Bact. coli* in nutrient broth showed that antisepsis occurs only when very large proportions of spice are used. When cinnamon and cloves were used in sufficient quantities, some germicidal as well as antiseptic action was noted. Mustard however, showed only very slight inhibitive action. Horseradish, the tests showed, possesses no antiseptic power, and garlic inhibits bacterial growth only in the highest concentrations. Furthermore, it was found that the spice in ordinary spice cake, present in palatable quantities, has no effect whatever on the growth or death of living microorganisms.

Previous studies concerning the effect of spices upon food preservation have included a variety of food products. In 1911, Hoffmann and Evans[20] published their work on sweetened apple sauce and cabbage. The cabbage was used to test the ginger, black pepper, and cayenne pepper. The food materials were placed in Erlenmeyer flasks in 100-gm. quantities, and the test spices were added. The products were then heated in flowing steam for 30 min., to remove all molds and vegetative cells of bacteria and yeast. The flasks were left open in the laboratory for several days to receive contamination from the air, after which they were stoppered to prevent evaporation. They were observed frequently for macroscopic signs of growth. It was found that cinnamon, cloves, and mustard are distinctly preservative in action. Similar tests were run in tomato broth, wherein cinnamic aldehyde was decidedly effective, eugenol fairly so, and benzoic acid poor in preservative action.

Kloss[21] reported studies on the use of mustard oil and chloroform on the yeasts growing in grape wine must. Both substances were most effective when the must was not actively fermenting. Cochran and Perkins[9, 10] studied the relative values of various essential oils as preservatives for cane-sugar solutions and starch syrups. While studying the effects of spices on pure cultures of molds and bacteria, Bachmann[1] added the ground spice, spice extract, and the active ingredient of the spice to nutrient agar and observed wide differences in the resistance of different species of microorganisms to the same spice, and of the same microorganism to different spices. Bachmann concludes that "'It does not appear from the extent of the present study that spices, as used in the kitchen, in the usual amounts for flavoring purposes in spice cakes, exert a very considerable preservative effect." Later the same author[2] reported studies in which a method of testing the strengths of commercial spices by inhibition of microbial growth is suggested. She noted wide variations in the antiseptic action of different samples of the same kind of spice.

Grove[14] while seeking preservatives for large quantities of tomato pulp, mixed extracts of various spices in tomato pulp, and selected the alcoholic extract of cloves as the most inhibitory. The oils of cloves and cinnamon,

*Contribution No. 98 from Food Research Division.
†A part of these studies were made by Dr. Edwin LeFevre, whose death occurred before completion of the work.

U. S. Dept. of Commerce

Bartering spices in Sumatra is an affair of interest to the native community, both child and adult

and various combinations of them with salt and scraped horseradish, were mixed into malt, which, after inoculation, was tested for inhibition of growth. Grove concludes, " . . . . it would seem possible to prepare a mixture of spices or essential oils which, when added in very small quantities to certain kinds of food, would act as a preserving agent and a flavoring agent at the same time. The oils of mustard, cloves, aniseed and cinnamon had a higher preserving value than any of the other kinds tried."

Lahache[26] also found mustard, cinnamon, and cloves to be the most effective antiseptics. Lahache concluded that the essential oils of spices are more powerful antiseptics than chemical preservatives. Using as an index of fermentation the change of rotation in sucrose solutions, Harvey[16, 17] studied the inhibitive action of various essential oils and concluded that the use of volatile oils of spices within the limits set by taste is an aid in the preservation of such food products as catsup, tomato sauces, and the like. In 1923, Bachmann[3] reported a study of the antiseptic action of spices in inhibiting the development of *Cl. botulinum* or its toxin in meat and mincemeat. The addition of 1 and 2 per cent did not retard growth, but 2.5 per cent of allspice and cloves produced some inhibition. Toxin was produced under all conditions.

Glassford[13], in 1928, discussing properties of various spices, said, "Most spices are antiseptic. The volatile oil they contain has the property of killing bacteria. That accounts for the instinctive liking of people in hot countries for highly spiced foods. Spices prevent fermentation and consequent intestinal toxemia. Preeminent among the antiseptic spices is cinnamon. Its volatile oil, which is present to the extent of from 0.5 per cent to 5.0 per cent, is a very powerful bactericide."

Danielson[11] reported on the preservative action of onions and garlic in sausage. He found that in quantities which are in any way palatable these substances do not retard the growth of putrefactive or disease-producing bacteria. While studying the effectiveness of a number of spices in preserving raw mangoes under different conditions, Prasad and Joshi[39] found that "none of the spices, except cloves when used by themselves for pickling mango, have any preservative value." He found "that 0.5 per cent cloves, 2 to 2.5 per cent cinnamon, and 10 per cent cayenne pepper, with steaming, preserve the pickles indefinitely . . . the addition of 20 per cent salt completely suppressed the growth of contaminating organisms."

Experimental Work

Because there is a general belief that the common spices possess preservative properties in foods, our brief investigation was undertaken to study various factors involved in the use of spices in food products. As there are great differences in the qualities of different grades of the same spice, every effort was made to obtain only such unground products as were of undoubted purity and freshness. For the purpose of testing these high-grade spices a *Bacterium coli* commonly found in the ordinary kitchen was selected. This organism also represents an important group of food spoilage bacteria. The general procedure was to add the ground spice in definite quantities to a liquid broth in which the *Bacterium coli* could readily grow. Whether or not the organism grew was the index as to the presence of antiseptic principles.

In each of the experiments the unground spice was first subjected to the action of formaldehyde gas in a closed container for several hours, usually over night. This treatment was found to be effective in destroying the microorganisms present on the spices, without altering any antiseptic power normally present. The spice was then placed in a sterile flask, and a current of filtered air was passed through for several hours. It was then pulverized in a sterile mortar, suitable precautions against contamination being observed. That this method of sterilization did not alter the inherent antiseptic properties was shown by the fact that sterilized spices inhibited microbial development in the same dilutions as did the unsterilized materials. Such tests also showed that no formaldehyde remained to act as an antiseptic.

In each case the ground spice was added to test tubes, each containing 15 cc. of sterile nutrient broth, in the quantities shown in Table I. Each tube was then inoculated with 1 cc. of a water suspension of *Bacterium coli* and incubated for 48 hr. at 30 deg. C. Frequent observations were made. Growth was indicated by the development of a marked turbidity and usually was checked in agar plates. The inoculations were so made that the resulting broth contained 1,000,000 and 2,000,000 bacteria per cubic centimeter before incubation.

Different samples of spices had shown varying degrees of inhibitory action. One sample of old mustard gave no inhibition whatever even in the highest concentrations. It is generally believed that the antiseptic action is due to volatile oils, and it is probable that no spice would, after long storage, have inhibitory effect. The object of the first experiment, therefore, was to determine the amount of inhibitive power contained in good spices. The results shown in Table I are the best obtained with the products indicated.

The results in Table I have in general been confirmed

Table I—Growth of Bact. Coli in Broth Containing Mustard, Cloves and Cinnamon

Spice	Amount spice (Mgs.) per 15 cc. of broth										
	960	480	240	120	60	40	30	20	10	Few grains	None (control)
Mustard	—*	—	+*	+	+	+	+	+	+	+	+
Cloves	—	—	—	—	—	—	+	+	+	+	+
Cinnamon	—	—	—	—	—	—	+	+	+	+	+

* + Indicates growth. —Indicates no growth.

Table II—Solubility Rate of the Antiseptic Principle of Cloves

Time of soaking (Minutes)	Growth of test organism in broth containing cloves				
	1.0 cc. (undiluted)	Diluted 1–10	Diluted 1–100	Diluted 1–1000	Diluted 1–10,000
2	—*	+*	+	+	+
4	—	—	+	+	+
6	—	—	+	+	+
8	—	—	+	+	+
10	—	—	+	+	+
15	—	—	+	+	+
20	—	—	+	+	+
25	—	—	+	+	+
30	—	—	+	+	+
1 hr.	—	—	+	+	+
1½ hr.	—	—	+	+	+
2 hr.	—	—	+	+	+
3 hr.	—	—	+	+	+
4 hr.	—	—	+	+	+
5 hr.	—	—	+	+	+
6 hr.	—	—	∓*	+	+

* + Indicates growth. — Indicates no growth. ∓ Indicates delayed growth.

Table III—Bacterial Counts of Broth Containing Ground Cinnamon After 20 Hours' Exposure

(Initial bacterial count 1,500,000 per cc.)

Quantity of spice	Total living cells after 20 hr. (Bacteria per cc. in broth)		
	Cinnamon	Cloves	Saline
None (control)	123,000,000	120,000,000	846,000
Few grains	124,000,000	95,000,000	
60 mgs.	18,000	0	
120 mgs.	30	0	
240 mgs.	0	0	
480 mgs.	0	0	
960 mgs.	0	0	

Table IV—Living Bacteria in Inoculated Dough (Before Baking)

With spice			Without spice		
Sample	*Bac. subtilis*	*Bact. coli*	Sample	*Bac. subtilis*	*Bact. coli*
1	1,010,000	110,000	3	1,060,000	4,250
2	1,020,000	60,000	4	1,220,000	500
Avg.	1,015,000	85,000	Avg.	1,140,000	2,350

Table V—Living Bacteria in Cakes Made From Inoculated Dough

With spice			Without spice		
Sample	*Bac. Subtilis*	*Bact. Coli*	Sample	*Bac. Subtilis*	*Bact. Coli*
1	10,480	0	3	2,530	0
2	5,490	0	4	1,260	0
Avg.	7,985	0	Avg.	1,895	0

Table VI—Living Bacteria in Inoculated Dough
(After 2 and 10 days' storage at room temperature.)

	With spice		Without spice	
Days	*Bac. Subtilis*	*Bact. Coli*	*Bac. Subtilis*	*Bact. Coli*
2	740,000	9,200	900,000	900
2	695,000	10,100	750,000	1,020
Avg.	717,500	9,650	825,000	960
10	680,000	0	429,000	0
10	490,000	0	500,000	0
Avg.	585,000	0	464,500	0

Table VII—Numbers of Living Bacteria in Cakes Made From Inoculated Dough
(After 2 and 10 days' storage at room temperature)

	Bacillus Subtilis	
Days	With spice	Without spice
2	1,050	1,650
2	1,800	800
Avg.	1,425	1,225
10	200	825
10	98	670
Avg.	149	747.5

several times by tests on samples from different sources. During the course of these tests occasion arose to determine the length of time necessary for the full strength of the antiseptic principle to be dissolved out of the spice.

Cloves were sterilized as usual, ground aseptically, and shaken in a flask of sterile broth. The flask was held at room temperature and shaken frequently, and aliquots were removed periodically and tested by dilution and inoculation. As shown in Table II, the greatest part of the antiseptic principle is dissolved out in the first 4 min. The solution showed no further increase until after 6 hr. of soaking, and then it was but very slight.

In studying the antiseptic power shown by these spices, tests had indicated that in the presence of cinnamon and cloves in high concentrations, the test organism not only was not growing but also was dying off far more rapidly than could be explained by the normal death rate of dormant bacteria. This suggested that the spice was exerting a germicidal as well as an inhibitive action. To test this, two series of plain broth tubes were made up with cinnamon and cloves respectively, and inoculated as usual. After 20 hours' incubation, agar plates were made from the tubes, and the number of living cells was determined. The results listed in Table III show a definite bactericidal as well as an antiseptic action by both cinnamon and cloves.

Garlic occasionally is used in the old world "to prevent the development of objectionable microorganisms in pickle and sauerkraut fermentations." This raises the question as to whether or not it possesses antiseptic properties.

In testing garlic, fresh raw samples were thoroughly scrubbed, treated with formaldehyde as usual, ground, added to the broth in definite quantities, and inoculated with the *Bact. coli.* The same procedure was followed with horseradish. While it is doubtful that the formaldehyde actually sterilized the plant products, yet a marked reduction in the bacterial contamination was noted. These tests, therefore, were not pure culture experiments. Some difficulty was encountered in getting into the tubes as large quantities as were used in the dry spice experiments, but the results are comparable in a general way.

With the horseradish no antiseptic action was noted in any concentration, the *Bact. coli* growing in tubes almost filled with this material. With garlic, however, a slight antiseptic action was present, for growth did not occur in the tubes with the two highest concentrations.

Baking Experiments*

Tests in which the antiseptic powers of spices are determined in nutrient bacteriological media yield results which may not be applicable to the ordinary uses of spices in bakery products. Such factors as the heat of baking, the partial dehydration bakery products undergo, as well as the presence of other ingredients which do not enter into the tests in liquid broth, yet may be important in augmenting or removing antiseptic action. An experiment was run in which the growth of microorganisms was determined in spice and unspiced cakes, as well as in the dough itself. Preliminary tests indicated that during baking the non-spore-forming *Bact. coli* was largely killed by the heat. This made it desirable to use two organisms, *Bact. coli* and *Bac. subtilis.* For the tests a heavy suspension in milk of *Bact. coli and Bac. subtilis* (the latter present largely in the spore form) was mixed into the dough in the same quantity in which milk is ordinarily used. The microbial condition of the doughs immediately after mixing is shown in Table IV.

For examination, subsamples of 10 gm. of dough were weighed into sterile petri dishes, and then thoroughly dispersed in 90 cc. of sterile water, and dilutions and platings made therefrom. In examining the cakes, samples were obtained by mixing a total of 10 gm. from the inner portions of three cakes. This was then ground in a sterile mortar and pestle, with the slow addition of water until 90 cc. had been added. Dilutions and platings were then made therefrom.

As shown in Table V the *Bact. coli* apparently was entirely killed during baking and there was a marked reduction in the spore formers. In the samples mentioned above, no influence of the spice is noted. The doughs and the cakes were stored in moist chambers at room temperature, and samples were removed and examined on the second and tenth days. The results, listed in Tables VI and VII, show that presence of the spices bears no consistent relation to the bacterial content. In the doughs all the *Bact. coli* organisms had died, with apparently no effect from the added spice. The numbers of spore formers markedly decreased, but were not eliminated during the storage period. In the cakes, *Bact. coli* was consistently absent, and the spore formers showed a greater reduction in numbers than occurred in the uncooked doughs.

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Drying cloves beneath the tropical sun in Zanzibar

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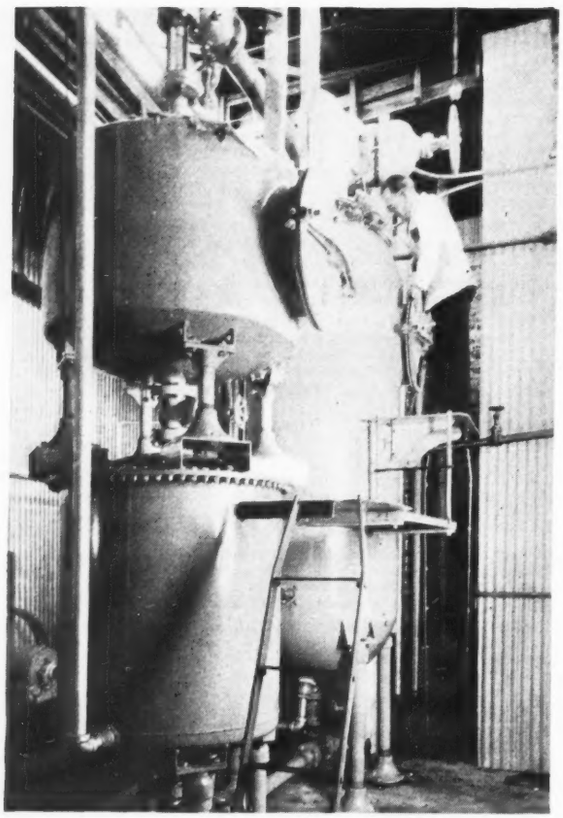

Fig. 1—When de-aerating a fresh batch, the operator must do it carefully to prevent its foaming over into the barometric condenser

High Vacuum Evaporation

As Used for Manufacturing Concentrated Fruit Juices

By A. M. MACKIE
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HIGH temperatures are not good for the flavors of orange and grapefruit juices, for they are quickly changed by heat into less palatable substances. In fact, we may say with confidence that, up to date, no processed orange juice that has been packed and pasteurized has turned out to be like the original juice from which it was made. Pasteurization gives it a peculiar aroma and a flavor which is generally characterized by the word "cooked." Only by keeping the various processing temperatures below 106 deg. F. can one produce from orange juice an article that will bear a close resemblance to freshly expressed juice and not be distorted in its flavor. In the case of grapefruit, however, the flavors are somewhat more stable.

Vacuum evaporation, therefore, is the indicated procedure if one is to produce a concentrate from orange juice and yet keep below the maximum permissible temperature. This requires specially devised equipment that will permit carrying a vacuum of not less than 29 in. of mercury at all periods of the process. The equipment which we use also has incorporated in it a reimpregnating device so that the highly volatile esters, which first distill off, are condensed, recovered, and reincorporated into the concentrated juice. Thus the method of concentrating orange juice employed at our plant is virtually a fractional distillation in which a first fraction is saved; the second fraction, consisting chiefly of water, is discarded; and the residuum, the concentrated juice minus most of its water. The first fraction and the residuum after concentration are mixed and compose the finished product.

Our process differs somewhat from those employed in other parts of the country, chiefly to the end that we recover the volatile ester fraction and return it to the concentrated juice, for we believe that the combination of volatile and non-volatile flavors of the orange are better than the non-volatile flavors alone.

A 29-in. vacuum is a very high vacuum and its constant attainment is not always an easy matter. It is especially difficult to maintain in Florida on account of the high temperature of the condenser water, and therefore, extra large barometric condensers are necessary, supplemented by a large, efficient cooling tower. The highest possible vacuum is essential during all stages of the concentration of a given batch, in order to prevent temperature rises that will scorch the product. However, until all of the free air is removed from the fresh juice in the first moment of a run, the temperature of the body of a liquid will be higher than that which prevails after steady boiling sets in, and during this de-aerating period, a 26- to 27-in. vacuum is the maximum attainable, although 29 in. can be obtained after the pan is in steady operation. It is absolutely necessary to concentrate the juice at a very high rate of speed in order to produce a product of the best possible quality.

The first step before operating the pan is that of taking a reading of the soluble solids in the juice by means of a refractometer; and the next is titrating the acidity. From these data one can then know the end point to reach when the batch is to come off. Juice is then drawn by vacuum into the pan from the storage tank to the amount of about 400 gal. It is next de-aerated as far as possible without any heat, by drawing in the pan the highest possible vacuum, which at this stage is 26 to 27 in.—an operation which insures its being brought more quickly to a boil, and at a lower temperature than would otherwise be possible. At the outset, the liquid will foam up from 4 to 6 ft. in the pan, and the operator must be careful to watch the initial stages of the de-aeration and control it by the air valve to prevent loss of the product by boiling over into the barometric leg (Fig. 1). This de-aerating period lasts from 5 to 10 min., or until all of the free air has been removed from the liquid.

After some experience, the operator will observe that the temperature of the liquid in the pan gradually falls and the vacuum increases until the maximum possible has been attained. Steam is cautiously admitted to the coils when the de-aeration is nearly completed without

danger of overheating or carrying over the juice into the barometric leg.

We are able to maintain a vacuum of 29.5 in. (gage) with the barometric at 29.75 in., and on those unusual days where the barometer stands at 30 in. or higher, we have been able to reach a 29.75-in. vacuum. Under these conditions the temperature of boiling citrus juices ranges from 96 to 92 deg. F. The water is evaporated to the extent of 300 gal. in 1 hr. 40 min., or at the rate of 180 gal. per hour.

Capturing the ester fractions which contain the volatile flavors is accomplished by condensing the first vapors of one batch in the cooled concentrate of the batch just preceding. This means that the last run of any one day is made minus its ester fractions. To visualize the operation of ester recovery, it is necessary to study the illustrations and diagrams carefully. Batch No. 1 is drawn into the pan, de-aerated, and concentrated to a little more than one-fourth its volume. The esters from this batch are allowed to escape through the barometric condenser, for the simple reason that there is no previous batch in which to condense them. The concentrated juice is now pumped by means of a centrifugal pump from the pan (*A*, Fig. 2) into the reimpregnating apparatus, *B-C*, in which *B* is merely a receiving tank and *C* is a tank situated below, containing a pair of tubular coolers. Circulating the concentrate through the *B-C* system cools it to the temperature of the cooling water.

Batch No. 2 is drawn into the pan, *A*, and de-aerated as before. Steam is then admitted to the coils in the pan, but the vapors from the pan are diverted to the ester impregnator during the first 20 to 30 min. of the run instead of allowing it to go into the barometric condenser and be lost. Just above the receiver, *B*, is a jet condenser which discharges the cold concentrate from batch No. 1 into the receiver, thus condensing and capturing the esters from batch No. 2 plus whatever quantity of water comes over as vapor. The cold concentrate is recirculated through the *B-C* system until this phase of the operation is over. Of course, this means that the operator must overrun his concentration in pan *A* slightly, so that the reimpregnated concentrates in the *B-C* system will have the desired degree of concentration in spite of the water taken up during the reimpregnating process. We plan a finished ratio of 4 to 1.

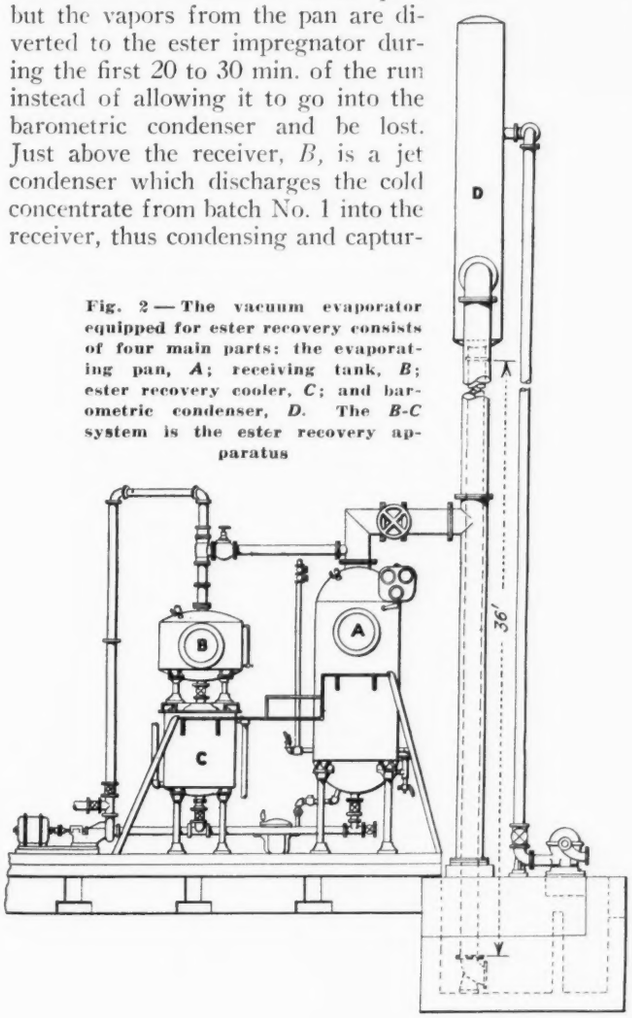


Fig. 2 — The vacuum evaporator equipped for ester recovery consists of four main parts: the evaporating pan, *A*; receiving tank, *B*; ester recovery cooler, *C*; and barometric condenser, *D*. The *B-C* system is the ester recovery apparatus

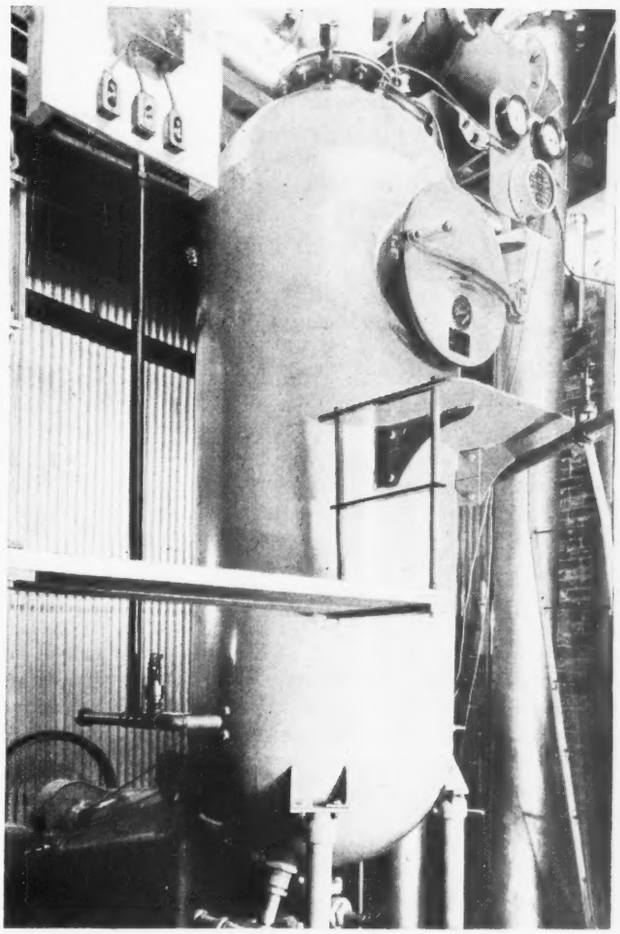


Fig. 3—Close-up of the pan controls with everything within easy reach

Succeeding batches of juice are handled in the same manner until the last one is reached, which has given its esters to the batch just preceding. Therefore it is made without any esters. But for the same reason its concentration need not be so great, because it will not be subsequently diluted in the ester recovery apparatus. Theoretically the esters are added back to the concentrated juice from which they came, but in actual practice, those from each batch are reincorporated with the concentrates from the next preceding batch—a procedure that is permissible because all of the batches are of exactly the same size.

Before an operator is thoroughly familiar with the operation of this type of vacuum pan, it is necessary to take successive refractometer readings on the product in the body of the pan. Samples for this purpose are drawn from the sampler on the side at two-minute intervals when it is near to the end point. This analytical procedure is important because the rate of evaporation of the water is nearly constant, but the residual volume is constantly decreasing. Hence the rate of concentration increases rather rapidly, in fact so rapidly that one minute

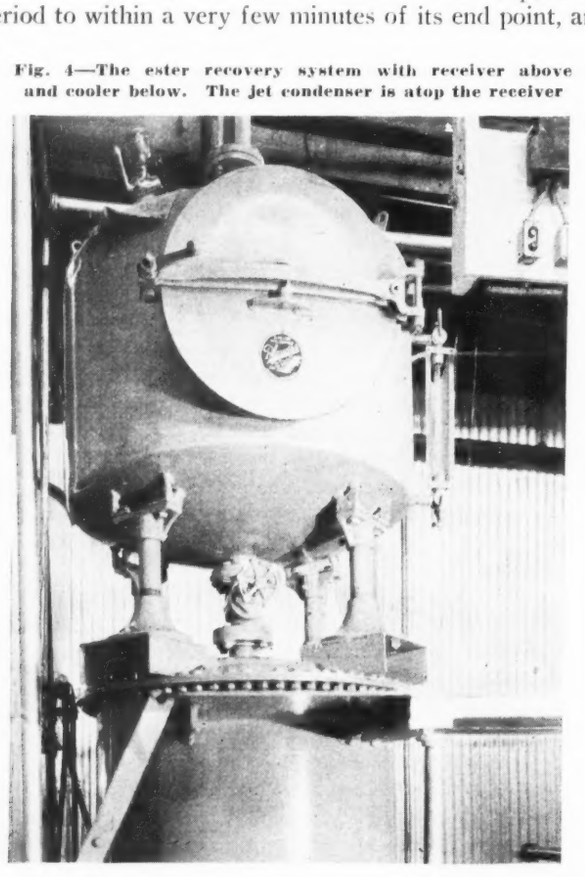
more or less at the end point will alter the concentration of the juice by from 2 to 4 per cent. For the analysis of the product at the rapid rate required in this work, there is nothing more suitable than an Abbé refractometer.

When the end point has been reached, the steam is cut off, the vacuum "broken," and the concentrated product is mixed with the ester fraction and run into either cans or barrels. Sodium benzoate is added or omitted, according to the customer's specifications. If preservative is omitted from the concentrated juice, it must be kept in cold storage at a temperature of 32 deg. F. or below. Spoilage of the 4 to 1 concentrated orange juice will take place in from 12 to 20 days at room temperatures (80 to 90 deg. F.) when no preservative is used, even if it is maintained under a 20-in. vacuum.

Flash pasteurization at 160 deg. F., followed by closing in hermetically sealed containers, will prevent spoilage of 4 to 1 concentrated juice in ordinary storage. When 0.2 per cent of sodium benzoate is used as a preservative, the product will not spoil in barrels stored at room temperatures. However, better color will be retained if the preservative juice is stored at 38 to 40 deg. F. This observation is particularly true of grapefruit juice.

Benefits derived from high-vacuum evaporation are that texture, color, and flavor of the goods are not impaired, as is the case where low vacuums are employed or where open-kettle boiling is used. Also one can standardize the product much more easily with this type of equipment. Operation of high-vacuum equipment is more difficult than the other usual methods of cooking jams, jellies, or citrus juices, but once the operator has learned the tricks and ways of his equipment, and the rate of concentration with which it is capable of performing, he soon becomes expert and can tell, even by the cracking noises which the pan makes, just how far the operation is going without looking into the inspection glass. Also he will be enabled to time the evaporation period to within a very few minutes of its end point, and it becomes unnecessary to keep checking the batches over a lengthy period. Once the time required to reach the end point has been determined, it becomes a routine job to operate the equipment.

Fig. 4—The ester recovery system with receiver above and cooler below. The jet condenser is atop the receiver



To those who are interested in high-vacuum equipment, it should be pointed out that it is very important to know definitely, in advance, how high a vacuum must be carried. Other points of importance are: knowledge of the mean, low temperature which one wishes to maintain, and the maximum time that may be used for one boiling. Such data must be determined by the purchaser of the pan and cannot be left to the equipment maker. This will require a chemical research into the properties of the product to be concentrated, so that when specifications for the equipment are written it will have the right capacity as far as volume of material handled per hour and the temperatures at which the evaporation will take place are concerned.

Possibly the principal reason why vacuum evaporation as a process for some fluids has been rejected is simply because the operators did not know in advance what conditions they actually required to obtain the best results. When expensive equipment is purchased without adequate scientific specifications, the buyer has only himself to blame if it fails to meet the requirements of successful production.

▼ ▼

Safety in Canning

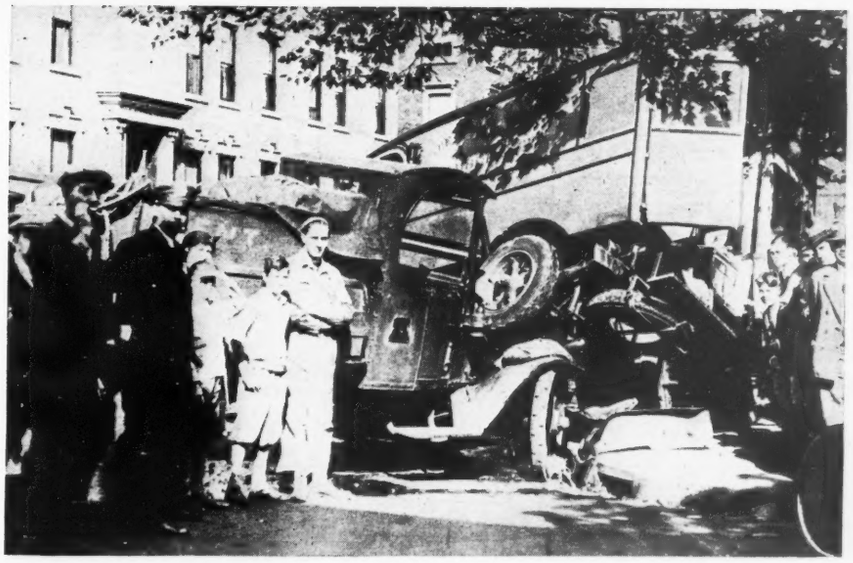
IN A paper read before the 20th Annual Safety Congress, Chicago, Oct. 12, 1931, E. E. Drews, of Libby, McNeil & Libby, spoke on safety in the canning departments of meat-packing plants. That portion of his paper that dealt with production equipment follows:

"There are a number of operations in the canning department that bear watching while handling certain food products such as picking chicken meat from the bones. Bone scratches are common and require prompt medical attention. In connection with this, as well as when peeling potatoes, onions, and other vegetables, we have knife cuts. There are also many dangerous machines in use. Without doubt, the most dangerous of these is the Enterprise hasher. Experience has taught that regardless of the size of the feeding table around the hopper which was designed to keep the operator's hand from coming in contact with the feed screw or worm, operators occasionally stand on a box or bench while feeding meat to the hasher, allowing them to reach the feed screw should they so desire. Therefore a galvanized iron feeding table 3 ft. square and 8 in. deep, with a cover which completely covers the hopper, has been adopted. An electrically controlled flap, fastened to the top cover of the table at the open end where the meat is forced into the hopper shuts off the power when the flap is moved $\frac{1}{2}$ in.

"Since the process of boning meat requires that the knife blade shall follow the bone as closely as possible, a drawing traction is exerted on the knife occasionally, the point of the knife becoming imbedded in the bone. When the operator applies pressure the point of the knife is released and unless the operator is wearing a leather apron serious injuries, sometimes fatal, usually result as he is pulling the knife toward him. Therefore, I believe the wearing of leather aprons by ham boners should be strictly followed.

"By adopting chip guards in lieu of using goggles for grinding purposes a decrease in eye injuries has been experienced."

By R. R. HOWARD
National Safety Council
Chicago, Ill.



P. & A.—Courtesy, Aetna Casualty & Surety Co.

Would You Be Afraid To Ride With Your Truck Drivers?

Nation-wide efforts have made commercial trucks safer than pleasure cars. Mr. Howard tells how you can put your truck fleet in the forefront of this effort to save money and human lives.

A PRESENT-DAY manager of a truck fleet in the food field has a difficult task before him. In the face of growing traffic congestion from passenger and commercial vehicles on our streets and highways, he is expected to keep up or to increase the speed of his deliveries. And in the face of an alarming increase in automobile accidents in most cities and most states, he is expected to keep down his compensation and property damage accident costs.

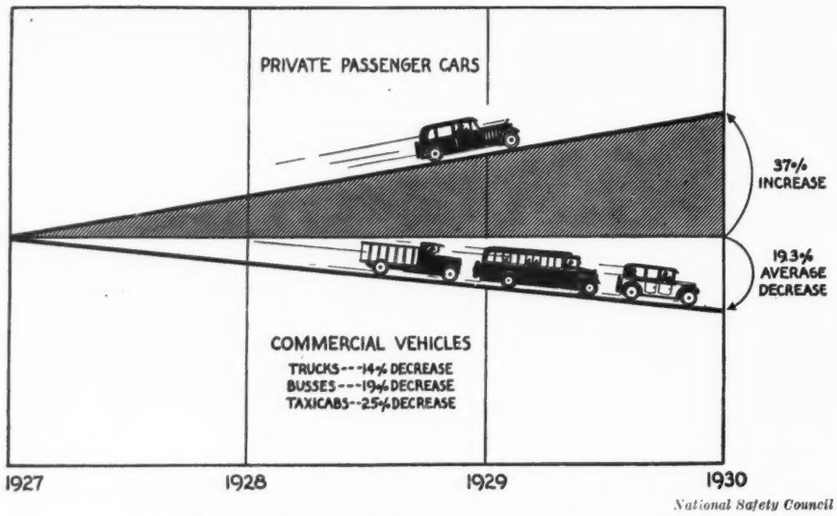
Faced by these problems, it is fortunate that the fleet manager has encouraging examples before him that many are successfully meeting these difficulties. Results of a recent nation-wide investigation by the National Safety Council revealed that while accident fatalities among private passenger cars had increased by 37 per cent over the three-year period from 1927 to 1930 inclusive, accident fatalities among commercial vehicles *decreased* by an average of 19.3 per cent. This included a decrease of 14 per cent in fatalities from truck accidents, 19 per cent from buses, and 25 per cent from taxicabs. These facts prove beyond a doubt the value of the increasing attention which managers of commercial fleets are giving to accident prevention and safety education programs.

There are many evidences of these safety programs. A number of states and many cities are conducting inter-fleet no-accident contests with good results in accident reductions. Many fleet managers, especially among the larger companies, have carefully planned safety programs which include greater care in the selection and training of drivers, a more rigorous follow-up of all accidents to place responsibility, and more consistent programs of study of accidents.

A thorough safety program by a manager of a truck fleet will require that his drivers be trained to meet four distinctive groups of accident hazards:

1. Non-traffic hazards on the premises of the employer, including hazards in loading and unloading merchandise, and features of the care and maintenance of the vehicle for which the driver is held responsible.
2. Non-traffic hazards on property not controlled by the company, including loading and unloading at warehouses, and making deliveries and pick-ups at residences and neighborhood stores.
3. Traffic hazards which do not involve the vehicle, consisting largely of those to which the driver is subjected as a pedestrian while in the street making his deliveries or repairing his vehicle.
4. Traffic hazards which involve the vehicle of the driver, which include possible collisions with pedestrians, other vehicles, street cars, trains, and fixed objects.

The safety training of the fleet driver should begin with the care and maintenance of his vehicle. This should include safe practice in filling the fuel tank or adding oil; instruction about hazards from spilled gasoline, open flames, and lighted cigarette or cigar; information about such fire-fighting appliances as carbon tetrachloride, carbon dioxide, or foam extinguishers; and cautions in removing caps from overheated radiators,



The number of private passenger cars and commercial vehicles involved in fatal accidents shows the above trend

watching the condition of his tires, cranking his car safely, and the emergency examination of his car.

The many possible hazards in loading and unloading include improper clearance for work; breathing carbon monoxide gas from the engine; improper skid and runways; carelessness of new helpers; improper piling and loading of material; loading or unloading from poorly chosen location; ignorance of how to lift properly; lack of protective clothing; handling materials with storage apparatus; carelessness with heavy objects.

The fleet manager must consider a number of factors in the selection of his drivers that are more or less negligible in the selection of factory workers or laborers. Very soon after his employment the driver is out on the highway, away from observation and supervision. The driver represents his employer before the public and helps to mold company good will. In addition to a possible waste of time and costly mistakes, the incompetent driver may have characteristics which will lead to accidents, injury to persons or destruction of property.

Here is a brief summary, compiled by the National Safety Council, of the physical and mental qualifications of a good driver: "The movement of his hands, legs, feet, and head should be unrestricted and easy. Freedom from trembling or involuntary jerking of head or limbs is desirable. Good eyesight is essential and any appreciable deafness may cause difficulties. Mental alertness is usually more important than extensive schooling. A record of epilepsy or dizzy spells is cause for rejection. Heart action should be normal."

It is desirable that every prospective new driver should be given a physical examination by a doctor, and the doctor, of course, should know the qualifications desired. At least, arrangements should be made to have all doubtful cases of new employees reviewed by a physician. His report should be in writing and filed as a part of the employment record of the driver.

When drivers are not examined by a physician, here are some practical suggestions to the person who hires them for observing their physical or mental defects:

1. "By watching how a man uses his feet, hands and body in walking, standing, or writing, one can usually detect any serious crippling or nervous unsteadiness.

2. "Eyes may be tested roughly by having the man read newspaper print at arm's length, with each eye separately while holding a card over the other one. Better still, a Snellen or similar test chart (costing one dollar or less) may be hung on a convenient wall and each man tested with it while he is being interviewed. Men who wear glasses should be tested with them and without them to determine how much their loss or breakage would be a handicap, and whether the glasses really improve vision. Vision should be approximately normal or corrected to normal in both eyes before the driver is permitted to drive. Color blindness can usually be detected by asking the man to select a certain color from a large number of red, green, and gray yarns or cards of various shades. More rapid and accurate are the specially prepared tests for color blindness such as the Ishihara charts. These are inexpensive and may be applied to anyone in a couple of minutes.

3. "Hearing may be tested roughly by asking the driver to listen to an ordinary watch. In a quiet room he should be able to hear it tick at least 3 to 5 ft. away.

4. "Drivers who are very slow to react to situations which suddenly confront them, or who easily become rattled, may often be detected by observing whether they become confused when instructed suddenly to do several things in quick succession.

5. "If a man cannot successfully follow simple instructions or fill out accurately the blanks on an ordinary application form he may be too ineffectual mentally to make a good driver, and his intelligence should be questioned. He should be able to read so that he may understand traffic signs.

6. "Some men who may be otherwise desirable are handicapped by health, financial, family, or other worries, which make it impossible for them to be continually alert and attentive while driving. If such a mental state can be discovered in interviewing the applicant, he may be saved from possible accidents by being placed, temporarily at least, in some other work, by adjusting the difficulties causing his worry, or by postponing his employment as a driver until the unhappy state has passed."

A thorough road test should be required as well as knowledge of all legal requirements of a driver. Many companies use application forms which include questions on traffic rules and regulations. The examiner who gives the road test should have a list of specific things to observe and perhaps a rather complete chart for scoring the applicant. Some companies have a probation period for certain drivers, including a review of the safety record of these drivers at the end of six months or a year.

Careful attention should be given to the training of the new driver. Some large companies prefer the hiring of men who have had no previous driving experience. Companies who employ helpers for drivers usually prefer to have each regular driver train his helper, thus permitting the management to observe over a long period of time the ability and habits of the prospective driver. It is the custom, however, for most companies to select experienced drivers and then train them in the details of the company business.

The driver should definitely understand his responsibilities in the care of his car. He should know exactly what to do in case of mechanical trouble on the street or highway. Such instruction should be in writing and

either given to each driver or posted in the garage. He should have definite instructions in traffic rules and safe driving practices. Many companies have a drivers' rule book, and oral or written tests from it as a part of their safety program. The safety training of both the new and the old driver should be continuous. Often the old driver, because of careless habits or inefficient methods, is especially in need of such instruction.

A well-planned safety program will include a practical method for tabulating accident data. The first essential is an accident record for each driver. This will make possible the re-training of any driver for the correction of minor bad habits, and provide the data needed in safety competitions and as the basis of salary promotions. All drivers should be trained in assembling data from accidents in which they are concerned.

After a period of time such accident data will become invaluable to the fleet manager in determining what types of accident occur most frequently, where most accidents happen, relative responsibility of drivers in accidents, what can be done to eliminate accident causes, what reductions have been made in accident causes, and which employees are accident-prone.

Perhaps the most important factor toward accident prevention with the individual truck fleet is to maintain a proper safety atmosphere among all drivers. Toward this end many companies use safety dashboard cards frequently changed, safety posters for the garage and waiting rooms, and safety publications edited from the viewpoint of the driver. Many companies also give merit or bonus awards for periods of non-accident driving.

About a year ago leaders in the delivery, taxicab, and bus Section of the National Safety Council began to give consideration to the selection of some kind of safety merit award that could be promoted nationally to stimulate commercial car drivers to greater safety efforts. This resulted in the development of an official No-Accident Driver Award emblem, supplemented by a certificate, which now is presented without charge to any commercial vehicle driver who has operated for a full year without an accident.

In order to prevent possible controversies over the question of accident responsibility they decided to count "Any accident causing personal injury or property damage, regardless of who was injured, whose property was damaged, or who (what) was at fault, and regardless of whether the vehicle was in motion, temporarily stopped in traffic, or parked at the curb."

Many individual companies, in the award of their own certificates or bonuses, are not quite so strict in the interpretation of an "accident." These companies prefer not to count as an accident a vehicle slightly damaged while parked at a curb and through no fault of the driver.

Since the No-Accident Driver Award medal was announced a few months ago, about 100 different organizations have presented such awards to about 700 drivers. As an example, the H. J. Heinz Co. recently presented No-Accident Driver Awards to 57 of their truck drivers in 28 different cities, who had had no accidents during 1930. These presentations were made at special meetings called to honor the medal winners and presided over by high company executives. Likewise, the Franco-American Bakery of Los Angeles, with about 25 trucks, recently presented awards to seven drivers. The Seven Baker Brothers, Pittsburgh, Pa., with over 100 trucks, also recently presented awards to their no-accident drivers.

The Jung Baking Co., of Joplin, Mo., once a year presents to all drivers of its 35 trucks who have completed a year without an accident a radiator gold star. And to all drivers who carry this star on their trucks for another year—that is, who have no chargeable accidents during that year—the company gives $25 in cash or one extra week vacation.

Wilson & Co., meat packers, of Chicago, recently presented to those of their 1,000 motor vehicle drivers who had gone for a full year without an accident a radiator award emblem and a check for $25. They also have another kind of safety emblem which is presented for three months without an accident. All accidents by drivers are investigated by a local trial board to fix responsibility.

The Liberty Baking Corp., New York City, has a rather novel bonus arrangement plan for the drivers of its 300 trucks for the delivery of bread in 22 different territories. For each month that a salesman drives without a chargeable accident he is given a safety coupon and $1 in cash. Twelve safety coupons received during the year may be exchanged for a safety certificate. The company reports that it had only 22 accidents in its 22 different territories for the months of January and February 1931, as contrasted with 39 accidents for the same periods in 1930, and 63 accidents in 1929. As proof of the increasing interest of commercial vehicle fleets in safety programs, for 1930 nearly 20,000 vehicle fleets reported their accident experiences to the National Safety Council, as contrasted with reports from only 7,500 in 1929.

These fleets were classified in six principal types. Horse-drawn fleets had the lowest average accident rate per 100,000 vehicle hours, with an average of 18.58, as compared to 20.65 for passenger cars, 23.61 for commercial trucks, 32.46 for electric vehicles, 53.45 for taxicabs, and 104.80 for motor buses. On the basis of rates per 100,000 vehicle miles, however, the results are decidedly different. From this basis horse-drawn vehicles had an average of 15.37 accidents, as contrasted with 6.57 for passenger cars, 6.44 for commercial trucks, 14.48 for electric vehicles, 14.82 for taxicabs, and 8.25 for motor buses.

Commercial trucks were further classified into twelve groups, which included three groups of food industries—namely, dairies and bottling companies, bakeries, and meat packing. Following are the comparative accident rates per 100,000 vehicle-miles for each of the twelve groups: Petroleum, 2.95; lumber and building materials, 2.65; miscellaneous retail stores, 2.69; *dairies and bottling companies, 4.81;* miscellaneous industrial, 5.93; *bakeries, 6.81;* transportation freight and trucks, 3.42; public utilities, 5.93; laundries, 7.84; ice and coal, 10.52; *meat packing, 8.82;* and department stores, 11.21.

Experience With Metals In Milk Plant Equipment*

By LOOMIS BURRELL
Chairman of Board, Cherry-Burrell Corp., Little Falls, N. Y.

IN MOST places where metals are used they are protected from oxidation and corrosion by protective coatings; but with milk we have so far been limited to a smooth, bare metal, or one coated with vitreous enamel, so that a consideration of the action of the metal itself on the milk and the milk on the metal is most important. The first requisites are that the metal shall not injure the quality of the milk and that it can be cleaned easily. Moreover, it must be reasonable in cost and capable of fabrication.

The requirements are so varied that probably there will never be one metal that is best for all purposes. Castings are required for valves and other fittings; forgings or stampings for separator bowls; sheets for vats and tanks; and tubes for coolers and sanitary milk pipes. In handling sheets especially we must be able to make enduring seams or welds.

Forty years ago the equipment used in connection with milk was very simple and consisted mostly of vats, pails, cans and dippers, all made of tinned iron or "tin plate." This was satisfactory as long as the iron was completely covered with tin, but in use it was not long before rust began to appear and so the search started for a more satisfactory metal and has been continued ever since.

We are all familiar in a general way with the metals used in milk plants—for example, copper, tinned copper, aluminum, pure nickel, chrome nickel steel, and many other alloys. We have been told how most of them act when immersed in milk and various solutions; but I want to call attention to some characteristics that are not so often talked about but become apparent when two different metals in the same piece of equipment come into contact with milk at the same time.

When I was a boy we had an old tinsmith who sometimes soldered a piece of sheet zinc into the bottom of a tinned iron pail or a watering pot to keep it from rusting, and, to a considerable extent, this little piece of zinc did prevent rust. In 1908 a well-known European company was manufacturing seamless drawn-steel milk cans. In the center of the bottom on the inside of each can was a depression which was filled with a zinc or aluminum alloy to prevent the can from rusting, and they were sold as rustless cans. This piece of zinc in the bottom of the can was quite effective, but it soon became more or less porous and therefore was objectionable from the sanitary standpoint.

In passing I want to point out that the old imported soft iron tinned sheets could be used much longer without rusting than the tinned steel sheets on the market today. The same is true with soft iron pipe as compared with steel pipe.

Tin prevents iron or steel from rusting by covering it, but any small spot of iron not covered by the tin quickly rusts. This is not so with zinc, for it prevents rust not only by covering the iron but also by galvanic action, because zinc is electro-positive to iron, which means that the zinc will be corroded and the iron or steel protected. Tin, on the other hand, is electro-negative to iron and therefore in this combination iron will be attacked.

Several years ago, shortly after we had started selling spray pasteurizers, we had what we thought an unusual amount of trouble with the inside tinned surface of the vat turning black. These vats had tinned-copper milk agitators. We asked the experts of the Rome Brass & Copper Co. to assist us in our investigation, and they, with our research workers, finally came to the conclusion that this spotting of the tinned surface in the vats was caused by electrolytic action, due to the fact that when we cut the agitators out of heavy tinned-copper sheets, we did not tin the edges of the agitator blades but left them bare copper.

We conducted this investigation by making up a lot of little tinned copper pans to represent our tinned copper vats and into these placed agitators of different material. We found that when we used bare copper for the agitator, the agitator being electrically connected with the pan, black spots very quickly formed on the tinned surface of the pan or vat. When we took pains to see that every particle of the pan and also the agitator was covered with tin, the trouble was much lessened. Then we further found that if we made the agitator out of sheet aluminum we could to a very large extent prevent the tin turning black even under adverse conditions. This meant that the aluminum agitator would in time be corroded, but we felt that it was much less expensive and less difficult to replace the agitators occasionally than to retin or replace the vat itself. The explanation of this action is that copper is more noble, or electro-negative, than tin and when the two are electrically connected and in contact with a liquid that will serve as an electrolyte, the tin will become corroded and the copper protected. If, on the other hand, we have aluminum in electric contact with tin, aluminum is electro-positive compared with tin. Therefore it will be attacked and the tin protected.

Copper is electro-negative to all common metals. If it is electrically connected with another metal, and both are in contact with a liquid which will serve as an electrolyte, it will cause the other metal to corrode or rust. Aluminum, on the other hand, is electro-positive to all the other common metals and if in electric contact with them and an electrolyte, will itself corrode and the other metal be protected.

Many electrochemical tables have been prepared, attempting to arrange metals in order, showing those that are more electro-positive or electro-negative. It is difficult to have this accurate in all cases, as it depends on conditions. Also, in many cases, we are not dealing with the bare metal itself but a thin film of oxide covering that metal. In general, if we start with aluminum as the electro-positive metal, or the one which will be first attacked, we can write the list as follows:

Aluminum
Zinc
Iron
Nickel
Tin
Lead
Copper
Silver

Under some chemical conditions related to the oxygen content of the material these ordinary relations may be upset. If two metals are to be used in the construction of a piece of equipment their position in the electrochemical scale must be taken into consideration.

In this country, aluminum has been used only in a most limited way for the construction of dairy equipment. This summer it was my privilege to visit a number of milk plants in England, France, and Switzerland, where I saw a great deal of aluminum equipment used. In the new milk plant of the Ofco Society in Paris practically every piece of equipment in the plant is of aluminum and the paper bottles into which the milk was finally put had aluminum bottoms and caps, while the inside surface of the paper itself was aluminum coated to render it waterproof. In Geneva, Switzerland, I was told the largest milk plant is that of the Laiteries Reunies. There the milk is received in cans much like ours, but made of a new aluminum alloy that is strong, light, and hard. This alloy, I understand, is aluminum with 0.5 per cent each of magnesium and manganese and 1 per cent silicon. The milk is dumped into four seamless aluminum weigh cans and these discharge into an aluminum receiving vat. From there it is pumped up into aluminum storage tanks.

In this plant fancy cheese and butter also are made, and I noticed that the cream vats were of aluminum. Upon inquiring in regard to the method of washing this equipment, I found that to the alkaline washing powders was added 4 or 5 per cent of sodium silicate.

Aluminum has many characteristics

*Abstract of a paper read at the meeting of the International Association of Milk Dealers, Atlantic City, N. J., Oct. 31, 1931.

to recommend it for dairy equipment. It is free from the charge of injury to the flavor of milk, is easy to work and weld; but it has not been popular in this country, principally because we have not been willing to take the necessary pains in caring for it. The Aluminum Co. of America tells me that there are now alkaline cleaners on the market that are satisfactory to use with aluminum, among them being Oakite "Aviation" cleaner and the J. B. Ford Co.'s "Cherokee" cleaner.

Much has been said about metals and off-flavors in milk. I want to caution you, in thinking of the results of experiments with small pieces of the metal, to consider the length of time of exposure, the relation of surface to volume, the temperature, the amount of air dissolved in the milk, and the other comparative conditions. These must all be taken into account; otherwise, the tests are incorrect. About seventeen years ago we had an experience that was to us most surprising. A producer of high-grade milk was using our milkers, including pails of tinned steel. In time the pails began to rust and we were asked to supply new ones, if possible of more durable material. We shipped the farm some pails with 18 per cent German silver bottoms, drawn so as also to form part of the sides. Shortly after starting to use these new pails, the farm began receiving complaints about the flavor of the milk. There was no trouble for the first several hours after the milk was drawn, but after it was 24 hr. old it was certainly not right. Because of the time necessary for the development of the bad flavor we supposed it was caused by bacterial growth, but after careful investigation found this was not true and finally established beyond question that the trouble was caused by the warm milk coming in contact with the German silver. The gradual development of objectionable flavors after contact with certain metals is now quite generally recognized.

It is said that copper and copper alloys produce objectionable flavors in milk, but milk normally contains a small quantity of copper and it is really a question of how much, and how the copper is taken up by the milk.

Not long ago one of the large milk companies of this country, whose officers are extremely particular about milk flavor, decided to build an important new pasteurizing and bottling plant. After some discussion it was determined to install sanitary pipe and fittings made of a copper-nickel alloy. When the plant was started very careful tests were made and it was proved that under the conditions existing at that plant the flavor of the milk was not injured by passing through the copper alloy tubing.

In making statements regarding the commercial suitability of using certain metals with milk, consideration must be given to the exact way in which the metal will be used.

It has been found from experience that there is a great difference in the durability of some metals, depending upon whether the milk is being heated in the particular piece of equipment or is being cooled or simply held at a stationary temperature and also how much air there is in the milk.

Certain methods of sterilizing milk equipment have worked havoc with it. Take, for instance, a vat built of tinned copper. If live steam is directed against a certain portion of this vat, the copper is such a good conductor of heat that the heat is spread out and the gradual expansion of the metal takes place in a considerable area. If the vat is made of chrome nickel steel in place of copper, and live steam is directed against one spot in the sheet this will cause that one part to expand and, because chrome nickel steel is a poor conductor of heat, it will be confined to a small area and a buckle in the metal can be produced.

We took a sheet of chrome nickel steel and directed a jet of live steam against one spot in the sheet and felt with our hands on the opposite side. Directly back of where the steam struck the sheet it became hot instantly, so far as we could determine in this rough way, but the heat spread out from that one spot slowly.

I hope you will not conclude, from what I have said, that such metals as chrome nickel steel are not practicable for use where a heat transfer takes place through a thin wall of the metal, for in practice in spray pasteurizers, internal tube heaters, and coolers we have been unable to notice much difference in heating or cooling milk using copper or chrome nickel steel. In use the heat is traveling through the thin metal, but in sterilizing with steam it is necessary to a certain extent for the heat to travel *along* the sheet, and this is unsatisfactory. It means that the surfaces to be sterilized must all be subjected to the heating medium.

A number of years ago, before we could obtain nickel sheets large enough to use one sheet for the side of our spray pasteurizers, we were obliged to make some welded seams at right angles to the axis of the vat. Some of these vats went into dairy plants where they were sterilized by putting in first hot water to cover the bottom of the vat, then adding steam so that the whole vat was heated gradually and the sheets expanded evenly. Good results were obtained bacteriologically and mechanically. In other dairies, in place of putting water into the bottom of the vat, it was the practice simply to use live steam from a hose, shooting it against the side of the vat, and we had complaints of breakage of these cross-seam welds. Upon investigation we found it probably was due to this rapid expansion of the metal in spots where the hot steam struck the surface. As nickel is a poor conductor of heat, the hot spot was localized and would actually cause a severe strain in the metal. The resistance of metals to cleaners used in milk plants is important; also the manufacturer and milk dealer must have in mind the action of brines. If brine is used in a copper milk cooler and ammonia leaks into it, even a small amount, many of us have learned from experience that the copper will be rapidly corroded and eaten through.

It is probable that the corrosive action of brine containing air is not so well recognized, but when calcium brine is aerated by draining brine pipes or allowing air to be beaten or pumped into the brine a certain quantity of hydrochloric acid is formed, and metals that are attacked by this acid will be corroded. Even the highly resistant chrome nickel steel may be attacked.

The manufacturer of dairy equipment is frequently put in a very difficult position. Some smelter or metal producer brings out a new metal. Various people put some of this new metal into beakers of milk and it appears to be unaffected and at the same time the metal produces no off flavor in the milk, whereupon it is recommended for dairy equipment. No one has actually had experience with it for any length of time in a milk plant, and even if it can be worked and welded satisfactorily it is not known how it will stand up in use, with the daily cleaning and sterilizing required.

Manifestly it is not fair that the dairy machinery manufacturer should assume all the risk. The milk dealer has inquired in regard to the metal and has demanded it and it would seem that he should assume in part the responsibility for the way it stands up in use.

We have been asked occasionally to give guarantees even for so long as five years on vats constructed of chrome nickel steel. This or the guarantee of other metals we consider out of the province of the dairy machinery manufacturer, one reason being that the life of the vat depends largely upon the treatment it receives in the milk plant.

For a manufacturer of dairy equipment to start using a new material he must go to considerable expense, learn how to fabricate the new material and usually redesign the equipment. Certain things that are easy with copper and can even be done with pure nickel are impractical with chrome nickel steel. As a simple illustration, a company wants a chrome nickel cheese vat with wooden rails. It is easy to turn over the top of a copper vat and nail it to the wooden frame and cover the nail heads with solder to make it smooth, but this is difficult if not impractical with a chrome nickel steel vat, and means that some other method of finishing must be devised. If the milk machinery manufacturer is to continue research work and supply equipment made of new alloys as they are discovered and proved of value, he *must* have the active and sympathetic support of the milk dealers.

In behalf of the milk machinery manufacturers, may I say that we are eager and glad to act as pioneers in the new fields always opening, but we can achieve success only when the milk dealers appreciate our difficulties, understand our problems, and cooperate in our endeavors.

What Depression Is Doing To Edible Oils*

THE current season is the third successive year of low prices for vegetable oils and raw materials, with supplies apparently more than ample to meet current requirements in all importing countries. Last year, the upward movement in the consumption of such products was checked. This year, imports of edible oils and raw materials have declined to a greater extent, despite unusually low prices, indicating a further reduction in demand.

The generally depressed conditions, of course, have affected the vegetable oil industry in many ways. A more specific influence making for reduced demand is the large supply and low price of such animal fats as butter and lard, both in Europe and the United States. The abnormal grain situation also has lowered the sale of oil-seed cake and meal for livestock feed.

Some measure of the economic importance of the changes in the consumption of margarine, particularly in European countries, upon the world-wide vegetable oil situation is afforded by data indicating that within recent years the total European production and consumption of margarine have fully equalled the total European consumption of butter.

The present volume of margarine production, fully twice that of the last pre-war years, was stimulated to a considerable degree by war-time requirements. With butter in European markets now lower in price than at any time since 1913, however, it is affording more effective competition with margarine and apparently checking expansion of the industry.

In Germany, margarine and butter consumption were almost identical in total volume. Production is estimated for both margarine and butter to have amounted in 1928 to 992,000,000 lb. and 719,000,000 lb., respectively. A net exportation of 3,000,000 lb. of margarine and an importation of 279,000,000 lb. of butter would indicate a total available for consumption in that year of 989,000,000 lb. of margarine and 998,000,000 lb. of butter. No current data are available as to margarine consumption in Germany, but it probably is increasing there, since butter consumption appears to be falling with falling prices.

The margarine industry of the Netherlands was adversely affected in 1930 by the low prices of butter and other edible fats in relation to the price of margarine. As a result of the comparatively low price, total butter consumption increased 12 per cent while margarine consumption fell off by 2 per cent. On a per capita basis, data indicate an increase in consumption of butter from 13.0 lb. in 1929 to 14.3 lb. in 1930, at the same time that margarine consumption declined from 20.3 lb. to 19.6 lb.

While there are indications that European consumers regard the prevailing low prices of butter as less conducive to the use of margarine, it appears, on the other hand, that considerable margarine is being consumed by hard-pressed producers in countries from which the cheap butter is exported. Large Russian orders for margarine have been received by Danish and German manufacturers, according to a Danish butter journal.

Prices of all the important edible oils and fats declined in 1930 from the 1929 level, and this decline continued during the first half of 1931. In the United States, prices of lard per 100 lb. at Chicago during the first half of 1931 averaged $9.60, as compared to an average of $11.68 for the same period of the preceding year. Cottonseed oil, which constitutes about 85 per cent of the oils and fats used in making lard substitutes, did not decline in price to such an extent as did lard. The New York price of cottonseed oil, prime summer yellow, declined from an average of 8.5c. per lb. during the first half of 1930 to 7.2c. during the first six months of this year. The low prices of these products during 1930 were largely the result of a weakened demand, since the production of both lard and lard substitutes was lower in 1930 than in 1929. Continued unfavorable demand conditions in 1931 doubtless have been an important factor in the price declines.

The production of cottonseed oil, the dominating raw product of lard substitute manufacture, increased from 1,581,631,000 lb. in 1929 to 1,616,102,000 lb. in 1930, an increase of 2.2 per cent. However, the estimated total disappearance of cottonseed oil was approximately the same in 1929 as in 1930. The trends in production of the other vegetable oils used in the making of lard substitutes varied somewhat. The factory production of coconut, corn, and soy-bean oils in 1930 was under the figures of a year earlier, but the production of peanut oil increased materially in 1930 as compared with 1929.

The relation between lard and lard substitute prices fluctuated rather widely in 1930. However, with the exception of a few months, the normal relationship between prices of these two products was maintained. During the first half of 1931 the premium of lard prices over lard substitute prices was lower than during the same period in 1930, but was above the first six months of 1929. Lard prices, thus far in 1931, have declined to a greater extent than lard substitute prices. The resulting spread, however, is more nearly normal from the seasonal standpoint than the margin existing during 1930. In most years this spread is relatively narrow during the first half of the year, but widens somewhat during the last half.

Reduced activity this year in American industries utilizing the leading vegetable oils is reflected in Census Bureau figures on factory consumption for the first quarter of 1931. The utilization of coconut oil, the largest single item in the manufacture of butter substitutes, was about 14.4 per cent below the quantity used in the 1930 period. Cottonseed oil utilization in the 1931 period was about 8.4 per cent below that of 1930. In addition to being the second most important vegetable oil in the oleomargarine industry, cottonseed oil is the leading item in the manufacture of lard substitutes.

A 38-per cent reduction appears in the factory utilization of peanut oil during the first quarter of 1931, as against the corresponding 1930 period. That oil is third in order among vegetable oils utilized in oleomargarine manufacture, according to reports of the Commissioner of Internal Revenue. The use of peanut oil has advanced steadily during the past several years with consumption for 1930 86.3 per cent larger than in 1929. Palm kernel oil, the fourth vegetable ingredient in importance in the butter substitutes industry, was down 16.6 per cent in the first quarter of 1931, as compared with the quantity so used in the corresponding 1930 period. In recent years the use of that oil also has materially expanded. In addition to the declines in vegetable oil utilizations for 1931 suggested above, declines of varying degree are apparent in the volume of animal oils and fats entering the oleomargarine industry. There has been a decided tendency in recent years to depend upon vegetable oils to an increasing degree in the manufacture of butter substitutes.

The second consecutive year of sharply falling prices placed the June, 1931, average wholesale price of prime lard at New York 18.6 per cent below the level of a year earlier, according to figures on wholesale prices issued by the Bureau of Labor Statistics. The price position of lard with respect to cottonseed oil was not made less favorable, however, since prime summer yellow cottonseed oil at New York declined only 18.0 per cent during the same period. The decline in butter values during that year resulted in extra creamery butter at Philadelphia being priced 33.9 per cent below a year ago during June. Crude coconut oil, the leading ingredient for butter substitutes, declined 34.2 per cent, according to New York averages over the same period. Other vegetable oils utilized in butter substitutes declined in varying degrees, while extra oleo oil at Chicago dropped 46.9 per cent. In the drying and semi-drying oils, New York values of linseed oil were down 38.5 per cent in June, compared with a year earlier, with soy-bean oil down 33.0 per cent.

*From Foreign Crops and Markets, Vol. 23, No. 6, Bureau of Agricultural Economics, U. S. Department of Agriculture.

ABSTRACTS OF CURRENT LITERATURE

Is Your Chocolate Icing Right? K. Camille Den Dooven, *Bakers' Helper*, Vol. 56, p. 870; Oct. 24, 1931.

The best chocolate for icing is one having a high fat content, owing to the glaze and keeping quality that the cocoa butter gives. It also keeps the icing soft and gives it a fudge appearance. The flavor and color of the icing depends upon the non-fat portions of the chocolate. Chocolate should be made into a solution before adding to the icing, and when the icing is ready for use it should not be heated over 90 deg. F.; 80 deg. F. gives best results. To prevent graying, the goods to be iced should be at a temperature 65 to 75 deg. F. and the icing done in a room of the same temperature; 65 deg. F. for summer, and 75 deg. F. for winter. Icing for wrapped cakes should have a lower invert sugar content and a higher cocoa butter content. Gum arabic also may be used to give the icing a non-sticking surface.

* * *

Quick-Freezing Citrus Fruit Juices and Other Fruit Products. E. M. Chace and H. D. Poore. *Industrial and Engineering Chemistry*, Vol. 23, pp. 1109-12; October, 1931.

Nearly a thousand packages of fruit juices and other fruit products have been frozen at temperatures well below —10 deg. F. Glasses and glass jars, with and without vacuum closure, and other types of containers have been used. Inert gas has been used to fill head space in some packages. Samples have been stored at 7 deg. F. for nearly 300 days, and then for 75 days at 45 deg. F. without spoilage and, in most cases, without seriously affecting the flavor.

* * *

Disposal of Citrus Waste. J. L. Heid, *California Citrograph*, Vol. XVI, p. 560; October, 1931.

The usual peel products—pectin, peel oil, candied peel and the like—use but a fraction of the waste products that accumulate from the numerous citrus-fruit packing houses, byproducts plants and juice manufacturing plants. Feeding the wet residue to stock has been tried; it is palatable but decomposes readily and can be sold only locally. Citrus residue has some humus value, but may increase pest hazards. It is possible to dry the residue, though its high moisture content (about 80 per cent) and the presence of pectin, acid and sugar has to be taken into consideration. At 12 per cent moisture content the dried waste keeps well and has much the same food value for animals as barley or dried beet pulp. Reduction methods involve the mixing of the waste with calcium cyanamide and allowing the mixture to stand for two or three weeks. A stable compound is produced containing 50 to 60 per cent moisture and from 4 to 6 per cent ammonia. Fermentation such as is used in treating garbage or sewage has been used successfully in the Becarri system of treatment. The waste is sealed for six days in small cubical cells 8 ft. on the side. During the treatment the temperature increases to about 145 deg. F. After this period, small ports are then opened and the fermentation continues for about 30 days. The product is then dried. It has a faint odor of ammonia and contains about 12 per cent moisture. Fermentation to alcohol or other products remains to be investigated. Destructive distillation is not economical at present prices.

* * *

"Rope" Spore Content of Flour and Its Significance. A. J. Amos and D. W. Kent-Jones. *Analyst*, Vol. 66, pp. 572-586; September, 1931.

Rope spore content of flour, unless particularly high, is of little significance in outbreaks of rope in commercial practice. Of far greater importance are the systems of fermentation, baking, and bread cooling employed by the baker. When this trouble occurs, the following rules should be observed in fermenting the dough: (1) avoid a long system of fermentation; (2) use a liberal quantity of yeast; (3) avoid low temperatures in the dough; (4) avoid slack doughs. The dough should be well baked and the bread should be cooled rapidly.

* * *

Sugars Differ in Capacity to Hold Water. P. E. Minton. *Western Baker*, Vol. 26, pp. 30-34; August, 1931.

The finer the sugar used in making cake icings, the greater its moisture carrying and holding power. An icing made of 200-mesh sugar lost 1.84 per cent of its weight after two hours, as against 5.08 per cent loss in an icing of 90-mesh sugar. Further standing up to 26 hours increased the moisture loss only slightly. Cakes made with increasing quantities of sugar from 80 to 115 per cent of the flour showed increasing porosity of top crust and increasing thickness of bottom crust. Crystallization retardants—starch, skim milk powder, glycerin, malt syrup, corn syrup, invert syrup—improved the top crust as a rule, but were without definite effect on bottom crust. Invert sugar was the best retardant.

Effect of Wheat Germ Oil on the Keeping Qualities of Fats and Food Rations. P. E. Roller. *Journal of Physical Chemistry*, Vol. 35, pp. 3286-92; November, 1931.

Wheat germ oil is not an unfailing anti-oxidant for fats, oils and food rations. The activity of the wheat germ oil is due to the glycerol in the fat or the acids and glycerides which the oil contains. It seems probable that the active oil contains the glycerides of hydroxy acids, which may consist largely of ricinoleic acid.

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GOVERNMENT PUBLICATIONS

Documents are available *at prices indicated from Superintendent of Documents, Government Printing Office, Washington, D. C. Send cash or money order; stamps and personal checks not accepted. When no price is indicated, pamphlet is free and should be ordered from bureau responsible for its issue.*

Cheese. U. S. Tariff Commission, Report 21, Second Series; 5 cents. Report to the President on the differences in costs of production of cheese, except of American or Cheddar and Swiss or Emmenthaler types, in the United States and in the principal competing country, as ascertained pursuant to the provisions of the Tariff Act of 1930.

Dried Egg Products. U. S. Tariff Commission, Report 25, Second Series; 5 cents. Report to the President on differences in costs of production of dried whole eggs, dried egg yolk, and dried egg albumen, whether or not sugar or other material is added, in the United States and in the principal competing country.

U. S. Tariff Commission Publications. U. S. Tariff Commission, subject index of publications, revised September, 1931; 10 cents.

Physicochemical Properties of Edible-Canna and Potato Starches, by J. C. Ripperton. Hawaii Agricultural Experiment Station, Bulletin 63; 10 cents. Reports joint study of U. S. Department of Agriculture and the University of Hawaii.

List of Technical Workers in Department of Agriculture, 1931. U. S. Department of Agriculture, Miscellaneous Publication 123; 25 cents. Includes outline of Department functions.

Removing Spray Residue From Apples and Pears, by H. C. Diehl and others. U. S. Department of Agriculture, Farmers' Bulletin 1687; 5 cents.

Controlling Orchard Insect Pests, by A. L. Quaintance and E. H. Siegler. U. S. Department of Agriculture, Farmers' Bulletin 1666; 25 cents. Describes insecticides, equipment, and methods.

Control of San Jose Scale in the Pacific Northwest, by E. J. Newcomer and M. A. Yothers. U. S. Department of Agriculture, Circular 175; 5 cents. Reports experiments on use of lubricating-oil emulsions.

San Jose Scale on Peach Trees in the South, by H. S. Swingle and Oliver I. Snapp. U. S. Department of Agriculture, Technical Bulletin 253; 10 cents. Treats of use of petroleum oils and oil emulsions.

Definitions and Standards for Food Products. Food and Drug Administration, Service and Regulatory Announcements, F. D. No. 2 (Second Revision).

Survey of the Preserving Industry, 1930, by R. S. Hollingshead and C. E. Birgfeld. Mimeographed document from Foodstuffs Division, Bureau of Foreign and Domestic Commerce.

Canned Foods in Hands of Canners and Distributors. Mimeographed document from Foodstuffs Division, Bureau of Foreign and Domestic Commerce. First comparative quarterly stock figures, giving July 1 and Oct. 1, 1931, comparison.

Alaska Fishery and Fur-Seal Industries, 1930, by Ward T. Bower. Bureau of Fisheries, document issued as Appendix I to Report of the Commissioner Fisheries for the fiscal year 1931; 25 cents.

BOOK REVIEWS

INDUSTRIAL MICROBIOLOGY. By Henry Field Smyth, University of Pennsylvania, and Walter Lord Obold, the Drexel Institute. Published by Williams & Wilkins Co., Baltimore, Md., 1930. 313 pp., 6¼x9¼; illustrated. Price, $6.

THE student and research worker in the field of microbiology will find in this book a valuable tool. No attempt is made to give all the details of the various microorganism characteristics and the conditions incidental to the industrial processes in which they are used. However, for a book of this size a surprising amount of data are included, even to indicating the chemical reactions involved.

The authors have been painstaking in their efforts to select from diversified fields and multitudinous sources information that heretofore has been almost inaccessible to the industrially employed man. Each of the twelve sections deals with a field of the industrial application of microorganisms and includes chapters devoted to the specific processes in these fields. At the end of each chapter is an inclusive bibliography that cites not only the existing literature on the organism in question but also the patents covering the processes in which it is used.

One section is devoted wholly to food and food products besides the several chapters involving food materials in other sections.

In addition to a subject index are included a chapter devoted to the relation of patent law to biological processes and a section giving official description chart forms and a tabulation of microorganisms used in industry.

The interesting style in which the text is written and the pleasing typography used make the book easy and enjoyable to read. E. S. STATELER.

* * *

CHANGES IN THE DEMAND FOR BUTTER —Report No. 39 (March, 1931) by the Economic Section of Empire Marketing Board. Published by His Majesty's Stationery Office, Adastral House, Kingsway, London, W.C. 2. 24 pp., 7⅞x9¾; 9 tables, 4 figures: paper. Price, 1s. net.

THIS report includes the results obtained in a survey during November, 1928, of the retail demand for butter in four English midland towns and those of another survey during November, 1930. In both surveys the same retail outlets were visited and comparable data were obtained. In that period imports of butter into the United Kingdom had increased 12 per cent. There was an increase of 28 per cent in the quantity imported from New Zealand, 15 per cent from Denmark, and 9 per cent from Australia. From Irish Free State the imports decreased 7 per cent; those from Russia also decreased. Imports from Argentina and Sweden increased.

The average wholesale price of butter decreased approximately 20 per cent during this two-year period; average wholesale food prices fell about 19 per cent, according to the Board of Trade index. It is interesting to note that no reference is made to butter imports from the North American Continent.

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THE IMPORTANCE OF THE RESTAURANT AS AN OUTLET FOR FOOD PRODUCTS. Prepared and published by the New York Food Marketing Research Council, 259 West 14th St., New York City. August, 1931, 25 pp., 11x8½; paper. No price stated.

IN THIS compilation of the papers read before the eighteenth regular meeting of the council on June 19, 1931 is included considerable subject matter that should be of interest to food production executives. "An Analysis of the Food Consumed in Restaurants Today," by A. F. Olsen, Department of Hotel Administration, Cornell University, presents some surprising figures on the ratio of different types of foods to total sales and on the per cent gross profit that each type gives.

The papers entitled "The Place Occupied by Hotels and Restaurants in the Distribution of New York's Food Supply," by William A. Nielander, Columbia University; "Changing Food Habits in Hotels, Clubs, and Restaurants," by J. C. Dahl, The Ahrens Publications; and "Trends in Restaurant Food Merchandising," by E. M. Fleischman, Huylers, Inc., New York City, contain data and discussion that food industrialists should have in mind when seeking a market outlet for their products and when making plans for the production of a food or food product.

* * *

FRUIT SUPPLIES IN 1930. Prepared in the Statistics and Intelligence Branch of the Empire Marketing Board. Published by His Majesty's Stationery Office, Adastral House, Kingsway, London, W.C. 2. April, 1931. 116 pp., 6x9⅝; 95 tables; paper. Price, 1s. net.

BULLETIN No. 38 of the Empire Marketing Board, is a compilation of some special articles that have appeared in the "Weekly Fruit Intelligence Notes" between April, 1930, and March, 1931. Some of the fruit production and crop condition information is out of date now. However, much import data for the year 1930 appears in this compilation instead of the "Weekly Notes," as has been the case previously.

Although most of the import statistics apply to United Kingdom receipts, reference is made to imports of fruit into Germany, Sweden, Norway, and Denmark, for the individual years of 1925 to 1930 inclusive. United Kingdom imports are differentiated as to kind and source for the same period of years.

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CHEMICAL ENGINEERING CATALOG. Sixteenth Edition. Published by Chemical Catalog Co., Inc., 419 Fourth Ave., New York City, 1931. 1017 pp., 11⅞x9¼, illustrated; cloth. Free to those holding responsible positions in the chemical industry in the United States and Canada; $3 to those chemical executives in other countries and to those in the United States and Canada for permanent possession; $10 to others.

CHEMISTS and chemical engineers engaged in food processing and manufacture will find this catalog a valuable reference aid. Compiled annually under the supervision of the American Chemical Society, American Institute of Chemical Engineers, and Society of Chemical Industry, it contains condensed data regarding equipment, machinery, laboratory supplies, heavy and fine chemicals, and raw materials used in industries involving application of chemical engineering. The last section of the book is devoted to technical and scientific books pertaining to chemistry, chemical engineering, and kindred subjects.

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FOOD ANALYSIS. By A. G. Woodman. Third Edition. Published by McGraw-Hill Book Co., Inc. New York, N. Y. 1931. 557 pp., 6x8¼; cloth; illustrated. Price, $3.50.

THOSE familiar with the earlier editions of Prof. Woodman's text will find changes made in this edition relatively few, chiefly those necessary to bring the analytical procedure up to date. The emphasis of the volume still lies, as it did in earlier editions, chiefly upon the fundamentals behind specific methods of procedure, and the interpretation of results.

The book is not intended to be a complete compilation of analytical procedure for testing foods; it will not take the place of such a work. Yet in the discussion of the varying suitability of apparently optional methods, in the "whys" —and, equally important, the "why nots" —it goes beyond its ostensible purpose as a college textbook. It will be valuable to plant chemists and analysts whose work is primarily in a single field and who occasionally encounter analytical problems requiring the destruction of mental cobwebs that have formed outside the daily range of experience.

PATENT DIGEST

Baking and Milling

Pie-Crust Molded Mechanically — Ejnar Christiansen, one-half to Carl Oscar Ericsson, Birmingham, England. No. 1,813,907. July 14, 1931.

Yeast Grown in Molasses Solution Containing Urea and Urease—Charles N. Frey and Alfred Schultz, New York City, and Arthur P. Harrison, Washington, D. C., to Standard Brands, Inc., Dover, Del. No. 1,814,210. July 14, 1931.

Unit for Cooking Stick Doughnuts in Continuous Manner—Herbert T. Hunter, Catonsville, Md., to Doughnut Machine Corp., New York City. No. 1,814,930. July 14, 1931.

Doughnut Blanks Separated by External Attachment to Cutting Machines—John M. Müller, Philadelphia, Pa., to John Baumann. No. 1,814,951. July 14, 1931.

Pastry Cone Baking Machine — Oscar Hauge, San Mateo, Calif., to National Biscuit Co., New York City. No. 1,815,911. July 28, 1931.

An Adjustable and Flexible Device for Holding Sliced Bread in Loaf Form to Prevent Drying Out and as Aid in Wrapping Operations — Otto F. Rohwedder to Mac-Roh Sales & Manufacturing Co., Davenport, Iowa. Nos. 1,816,399 and 1,816,400. July 28, 1931.

Beverages

Drum Type Mixer for Blending Finely Divided Dry Material Such as Coffee and Coffee Bean Chaff—William G. Burns and Archibald D. Kirkland to Jabez Burns & Sons, Inc., New York City. No. 1,825,261. Sept. 29, 1931.

Cocoa Powder Separated From Coarser Particles by Wind Separators, Arranged in Circles Around Air Filter—Richard G. Neumann, Wandsbek, Germany. No. 1,826,086. Oct. 6, 1931.

Malt Enzymes and Beverage Prepared by Grinding Malt and Dissolving Undesired Enzymatic Material With Water at Temperature Below Which the Enzymes of the Malt Are Active, Removing the Enzyme Solution, and Preparing a Beverage From the Residue—Eduard Jalowitz and Max Hamberg, Vienna, Austria. No. 1,826,790. Oct. 13, 1931.

Confectionery

Revolving Drum Machine With Automatic Feed for Manufacture of Candy Suckers—Fred Parnell, Medicine Hat, Alberta, Canada. No. 1,814,008. July 14, 1931.

Candy Cooled in Trays Placed Vertically About a Central Column — Emmanuel D. Rapp, Moran, Kan. No. 1,814,740. July 14, 1931.

Confections Covered With Granular Material by Means of a Belt Conveyor System That Returns Excess Granular Material to Source of Application—Peter Sisco, Chicago, Ill. No. 1,824,796. Sept. 29, 1931.

Canning and Glass Packing

A Can-Washing Machine That May be Adjusted to Fit Size of Can—Boleslaus Graban, Chicago, Ill. No. 1,814,551. July 14, 1931.

Distributing System for Handling Cans —John E. Albertoli, San Francisco, Calif. No. 1,815,029. July 21, 1931.

Black Deposit Prevented in Cans of Food Products by Pre-Cooking in Presence of Lead—James J. Barry, and William T. Murray, Gloucester, Mass., to Frosted Foods Co., Inc., Dover, Del. No. 1,815,227. July 21, 1931.

Cans Automatically Tested for Leaks—James H. O'Neill, and George Flook, Syracuse, N. Y., to Continental Can Co., Inc., New York City. No. 1,815,522 and 1,815,523. July 21, 1931.

Machine for Discovering Leaky Cans—Burt A. Deisch to McDonald Machine Co., Chicago, Ill. No. 1,815,837. July 21, 1931.

Dairy and Egg Products

Ventilator for Milk Cans—Lawrence J. Schugert, Madison, Wis. No. 1,813,964. July 14, 1931.

Curd Milled Mechanically in the Making of Cheese—Ralph W. Harris, Caneadea, N. Y. No. 1,814,033. July 14, 1931.

Hood Cap for Milk Bottles Made of Paper Impregnated With Resinated Sulphur—Carleton Ellis, Montclair, N. J. No. 1,814,135. July 14, 1931.

An Egg Treating Machine With Conveyor Systems to Carry Eggs in Racks to and Away From Treating Mechanism—Burgette E. Ford to the Sterolene Co., Chicago, Ill. No. 1,814,680. July 14, 1931.

Milk Case Washing Machines—Godfrey Christensen to Golden State Milk Products Co., San Francisco, Calif. No. 1,815,239. July 21, 1931.

Skim Milk and Virgin Olive Oil Emulsified to Give Product Simulating Human Breast Milk in Fatty-Acid Glyceride Content—Sidney Musher, Baltimore, Md. No. 1,816,339. July 28, 1931.

Fruits and Vegetables

String Beans Separated From Stalk by Passing Over Openings Which Permit the Beans to Fall Through—Frank Pittis Ryder and William Donald Chisholm, Niagara Falls, N. Y. No. 1,814,633. July 14, 1931.

Copies of Patents

Complete specifications of any United States patent may be obtained by remitting 10c. to the Commissioner of Patents, Washington, D. C.

Photostatic copies of foreign patents may be obtained at the same address, prices being forwarded on application.

Copies of patents should be ordered by number, as titles used in this digest seldom correspond with title of patent.

Citrus Fruit Juice and Milk Mixed and Dried to Give Non-hydroscopic Product—Clarence P. Wilson, Pomona, Calif., and Earl D. Stewart, Corona, Calif., to California Fruit Growers' Exchange, Los Angeles, Calif. No. 1,814,994. July 14, 1931.

Fruit Vending Machine—Nels P. Petersen to Antonettie M. E. Petersen, Los Angeles, Calif. No. 1,816,341. July 28, 1931.

Partially Dehydrated Fruit Treated to Remove Heavy and Light Foreign Matter by Vortex Formation Caused by Swirling Liquid in Circular Chambers Containing Fruit—Melville E. Dunkley to Rosenberg Bros. & Co., San Francisco, Calif. No. 1,822,276. Sept. 8, 1931.

Dried Dates, Split, Pitted, and Conveyed to Packers by Mechanical Means—Albert K. Smith, West Orange, N. J., to the Hills Brothers Co., Inc., New York City. Nos. 1,822,381 and 1,822,382. Sept. 8, 1931.

Dried Raisins Coated With Oil of Raisin Seeds—Thomas W. W. Forrest, to Sun-Maid Raisin Growers of California, Fresno, Calif. No. 1,823,265. Sept. 15, 1931.

Date Pitting Machine—Albert K. Smith, West Orange, N. J., to the Hill Bros. Co., Inc., New York City. No. 1,823,476. Sept. 15, 1931.

Fruit Paring Machine—Burton C. Coons, Rochester, N. Y., to Coons Machinery Corporation, Gates, N. Y. No. 1,823,854. Sept. 15, 1931.

General Equipment

Electrically Heated and Fully Inclosed Cooker — William C. White to Industrial Development & Manufacturing Corp., Portland, Me. No. 1,814,103. July 14, 1931.

Vacuum Cooking Kettle With Vacuum and Controlling Valve Mechanism Below Level of Kettle Rim—Alvin Hock, Cincinnati, Ohio. No. 1,814,927. July 14, 1931.

Refrigeration System Employing Closed Circulation of Refrigerated Air Through Parallel Tunnels—Ralph V. Grayson, Macon, Ga., and Claud M. Foster, Atlanta, Ga., 40 per cent rights to Polar Products, Inc., Atlanta, Ga. No. 1,814,915. July 14, 1931.

Machine for Sealing Collapsible Containers—Edward C. Angell, New York City. No. 1,815,284. July 21, 1931.

Top and Bottom Carton Sealing Machine —Wallace D. Kimball and Arthur E. Rideout to Standard-Knapp Corp., New York City. No. 1,815,571. July 21, 1931.

Machine for Wrapping With Elastic Transparent Wrapper so That Upon Shrinking the Wrapper Fits Snugly and Neatly on Article—Paul Langhammer to Package Machinery Co., Springfield, Mass. No. 1,816,085. July 28, 1931.

Meat Packing

Meat Chopping Machine With Conical Cutter Adapted to a Perforated Conical Head—John Wilson Brown, Jr., to the Enterprise Manufacturing Co. of Pennsylvania, Philadelphia, Pa. No. 1,815,829. July 21, 1931.

Apparatus for Freezing Fish in Buoyant Receptacles Floating in Liquid Refrigerating Medium of Predetermined Depth—Michel P. Vucassovich, Gloucester, Mass. No. 1,822,718. Sept. 8, 1931.

An Inverted-U Hanger for Use in Meat Smoking—Isaac N. Jordan, Chicago, Ill., to Armour & Co., Chicago, Ill. No. 1,823,149. Sept. 15, 1931.

Head and Viscera of Shrimp Treated by Steam and Centrifugal Action to Produce a Dried Edible Product—John W. Pittock, Swarthmore, Pa. No. 1,824,685. Sept. 22, 1931.

Miscellaneous Processes

Rancidity in Peanut Butter Inhibited by Crushed Sesame Seeds—Sidney Musher, Washington, D. C. No. 1,816,338. July 28, 1931.

Monochloroacetyl Insecticide, Fungicide, and Disinfectant for Use in Presence of Human Beings—Charles H. Peet to Rohm & Haas Co., Bristol, Pa. No. 1,816,441. July 28, 1931.

Railroad Car Cooled by Circulating Refrigerated Liquids — Charles A. Moore, Edina, Minn. No. 1,822,395. Sept. 8, 1931.

Food Materials Freed From Remnants and Metal Particles—Ralf E. Weber, Oakland, Calif., to Arthur W. Magnan, Los Angeles, Calif. No. 1,822,469. Sept. 8, 1931.

Method of and Apparatus for Storage and Shipment of Solid Carbon Dioxide—Charles L. Jones, Pittsburgh, Pa., and John E. Small, Douglaston, N. Y., to Dryice Equipment Corp., New York City. No. 1,822,626. Sept. 8, 1931.

Punch-Type Machine for Making Candy Suckers—William G. Lloyd, Lynn, Mass. No. 1,823,498. Sept. 15, 1931.

Coffee Beans and Similar Products Ground by Means of a Rotable Cylinder Provided With Projections on Curved Face Co-acting With a Knife Mounted to Scrape Cylinder—Benjamin A. O'Neill to Schutz-O'Neill Co., Minneapolis, Minn. No. 1,824,681. Sept. 22, 1931.

Jelly Preparation Consisting of Finely Divided Pectin, Sugar, and Tartaric Acid Crystals Coated With Fatty Material Having a Melting Point Less Than 218 Deg. F.—Albert Leo, Chicago, Ill. No. 1,827,991. Oct. 20, 1931.

Sugar and Molasses

Sugar Cane Chopped by Forced Feed Into Revolving Knives Which Co-Act With Knives on Stationary Disks—William Henry Morgan, Alliance, Ohio, to the Morgan Hurryeane Co., New York City. No. 1,814,177. July 14, 1931.

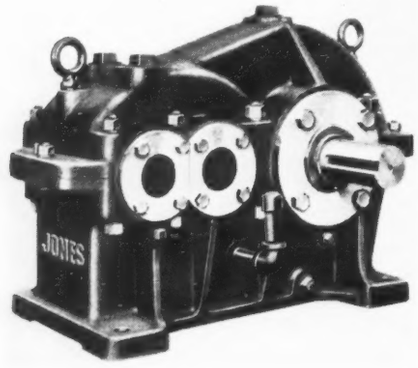
Sugar Cane Crushed Successively in Primary and Secondary Mill Sections With the Extracted Juice Defecated Separately and the Defecation Mud Returned to Its Respective Mill Section — Earle M. Copp, San Juan P.R., to Petree & Dorr Engineers, Inc., New York City. No. 1,824,875. Sept. 29, 1931.

Process for Preparing Refined Syrup by Use of Decolorizing Carbon and of Nascent Chlorine as an Oxidizing Agent — Eugene N. Ehrhart, Brooklyn, N. Y., and Leonard Wickenden, Manhasset, N. Y., to John J. Naugle, Greenwich, Conn. No. 1,826,855. Oct. 6, 1931.

NEW EQUIPMENT FOR FOOD MANUFACTURERS

Speed Reducers for Small Motor Drives

SUPPLEMENTING its line of large-size Herringbone-Maag speed reducers, the W. A. Jones Foundry & Machine Co., 4401 West Roosevelt Road, Chicago, Ill., has added a series of small reducers that have capacities up to 18 hp. Their reduction ratios range from 12 to 1 up to 48 to 1. In size they vary from $18\frac{3}{4}$ in. long and $12\frac{3}{4}$ in. wide to $21\frac{1}{4}$ in. long and 14 in. wide. In design these reducers have



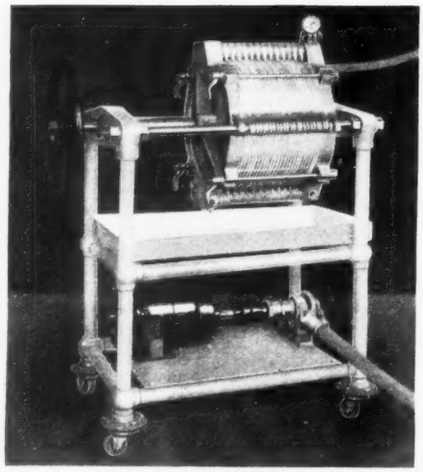
high and low speed extensions on both sides to eliminate the need of a right or left hand assembly.

On the high speed side, double helical gears actuated by rack shaped cutters with straight sides are used. The low speed reduction consists of a spur tooth form to give the necessary strength. Timken roller bearings provide low-friction mounting.

Asbestos Disk Filter

LIQUID food and beverage products, such as fruit juices, syrups, vinegar and the like, are freed from suspended particles and said to be made crystal clear in the asbestos disk filter manufactured by the Alsop Engineering Corp., 39 West 60th St., New York, N. Y. These asbestos disks are about $\frac{1}{4}$ in. thick and do not enter into chemical reaction with the usual type of liquid food products. They are available in different grades and are used in conjunction with rigid plates made from various metals according to the use for which the filter is intended.

The production capacity of the filters depends upon the number and sizes of disks and plates in the unit. The sizes range from a small bench model for experimental work to a large industrial model with high production capacity.



The various sizes may be used with one or as many as a hundred plates and disks held in position by numerous equally spaced screw clamps. The larger models are fitted with end castings and side bars to support the disk-holding plates. All models are reported to be easy to clean and operate by the ordinary laborer and to be readily portable. The pump-operating motors, all of low horsepower, can be run from an electric-light socket.

Paper Bags Closed and Sealed Automatically

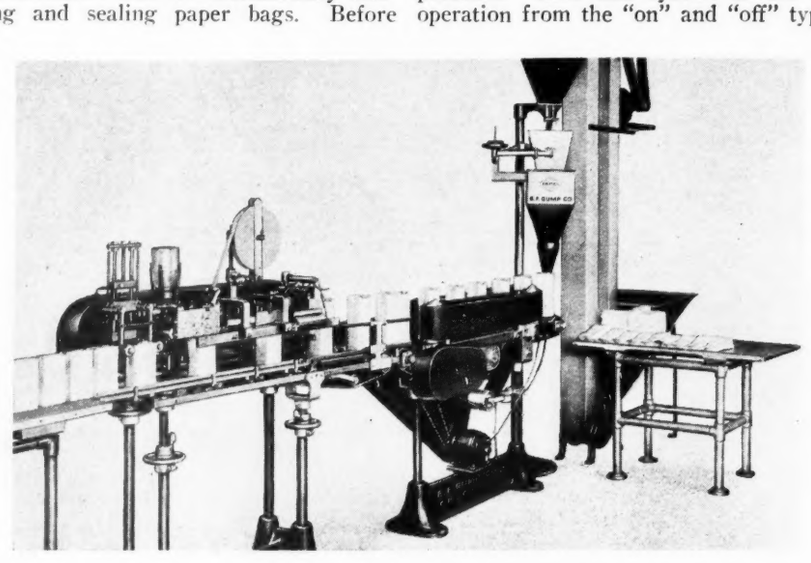
TO SUPPLEMENT its automatic weighing and filling machine the B. F. Gump Co., 431 South Clinton St., Chicago, Ill., has added to its products a combination unit for mechanically closing and sealing paper bags. Before reaching the closing machine the filled bags pass through a packer to make them compact and of a definite shape. The triple fold given the tops of the bags makes them as nearly airtight as possible with tape sealing, and of uniform size.

The unit is designed to handle single or lined bags at an adjustable rate up to 25 per minute for $\frac{1}{2}$ to $3\frac{1}{2}$-lb. packages. It has an over-all length and width of 12x1$\frac{2}{3}$ ft. and requires a $\frac{1}{6}$-hp. motor for the shaper and packer and a $\frac{1}{10}$-hp. motor for the folder and sealer. Adjustments permit the unit to handle bags ranging from 7 to 12 in. in height, 2 to 3 in. in width, and 3 to $4\frac{1}{2}$ in. in length.

New Type of Motor Operated Valve Control System

COMBINING sensitivity of action with power transmission, the proportioning motor control system for electrically operated valves recently announced by the Minneapolis-Honeywell

Regulator Co., Minneapolis, Minn., is said to eliminate the lag in operation that characterizes the control systems actuated by air, hydraulic, or steam pressure. Also this system differs in operation from the "on" and "off" type



of motor-operated valves in that a mechanical interconnection exists between the power unit and the electrical balancing mechanism which operates on the Wheatstone Bridge principle. Thus the motor is actuated to make valve adjustments gradually as the operating conditions demand and in this way extreme changes and cumulative effects are avoided.

The power unit, actually a motor-driven speed reducer, changes its drive shaft position whenever the conditions under control change ever so slightly. These conditions may be temperature, humidity, pressure, liquid level, rates of flow, stoker, or pulverizer feed, and similar factors in plant operation that may be under adjacent or remote instrument control.

The apparatus is obtainable in almost any size from the small integral units to those units requiring powerful motors capable of operating heavy loads.

Glass-Lined Vertical Holding System for Milk

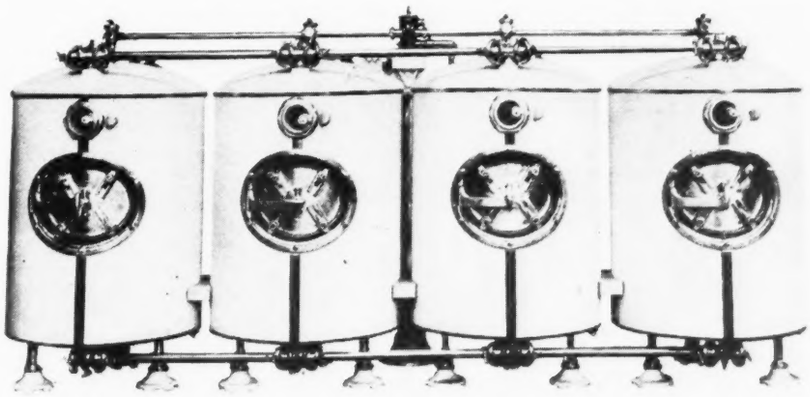
DESIGNED to handle 6,000 lb. of milk per hour the vertical holding system recently shown at the dairy show by the Pfaudler Co., Rochester, N. Y., contains the automatic features that characterize the high-capacity horizontal system. Furthermore, the holding units are fitted with side openings through which every portion of the interior can be cleaned by an operator standing on the floor of the room.

The filling, holding, and discharging operations of each of the four holding units are controlled by the motor-operated master valve. Milk does not enter this valve, which is so timed in its operation by the application of vacuum for filling and air pressure for discharging that while one of the four tanks is filling, another is discharging, the third is ready to hold, and the fourth is being held for 15 min. In this manner the operation is continuous until the entire run has been processed, with very small chance of spilling or contaminating the milk.

This vertical system requires only approximately 60 sq.ft. of floor space, whereas a horizontal system would take up considerably more. In its entirety it consists of four 200-gal. tanks, an electrically operated master control valve, an air compressor, a vacuum pump, outlet and inlet fittings, a flow regulating valve, an air heater, and the connecting pipes.

Systems handling 8,000 lb. of milk per hour also are available. The holding tanks in this higher capacity system occupy the same floor space as the 6,000-lb. system but require greater ceiling height.

Low capacity, glass-lined, vertical vats for mixing, pasteurizing, cooling, or aging ice cream, milk, cream, buttermilk or processed milk drinks were also shown at the dairy show by the Pfaudler Co. These vats have capacities of 100, 200, and 330 gal.



MANUFACTURERS' PUBLICATIONS

Glass-Lined Food Manufacturing Equipment—Detailed description of a mayonnaise mixer, tomato products cooker, apple-sauce machine, corn cooker, and a series of vacuum pan models is contained in bulletins Nos. 723, 724, 727, 728, and 726, respectively, prepared by the Pfaudler Co., Rochester, N. Y.

Mayonnaise Bottling Machinery—Two illustrated leaflets issued by the Elgin Manufacturing Co., Elgin, Ill., describe a semi-automatic screw capper and an entirely automatic high-speed rotary mayonnaise filling machine.

Unit Heaters—Catalog No. 469 describes and illustrates developments in five types of unit heaters manufactured by the Buffalo Forge Co., Buffalo, N. Y.

Research—Research facilities and specialized services of the Pittsburgh Testing Laboratory, Pittsburgh, Pa., are described in a 14-page illustrated booklet recently published.

Stoker Unit — An illustrated folder describing the C-E stoker unit, built in models 3, 4, and 5, all of identical design, has been published by the Combustion Engineering Corp., 200 Madison Ave., New York City.

Damper Regulators — Diagrams, descriptions and price lists of Victor damper regulators, manufactured by the Atlas Valve Co., 282-286 South St., Newark, N. J., are contained in a data and price book.

Temperature Control Systems—Bulletin No. TTCDI-937A, issued by the Bristol Co., Waterbury, Conn., describes electric automatic temperature control systems for dairy plants.

Tomato Juice Machine—Descriptions of the Indiana juice machine used for the extraction of tomato juice, and an improved cooking coil known as the Kook-More-Koil, are contained in two illustrated leaflets prepared by the Langsenkamp Co., 229-237 East South St., Indianapolis, Ind.

Bearings and Brakes—Bulletins No. S-349, dealing with steel-backed babbitt-lined bearings, and No. SD-338, discussing the subject of brake service for trucks, trailers, and the like, have recently been issued by the Wagner Electric Corp., 6400 Plymouth Ave., St. Louis, Mo.

Thermostatic Steam Traps—In an 8-page booklet, descriptions, price lists, and capacities of thermostatic steam traps for individual trapping systems are given by the Sarco Co., Inc., 183 Madison Ave., New York City.

Fractional-Hp. Motors and Generators—Split-phase motors, 1/20 to ¼ hp., and motor generator sets, including the 2- and 4-bearing types, also switchboard and instrument panels, are described by the Century Electric Co., 1806 Pine St., St. Louis, Mo., in bulletins No. 4-1 and 20-1.

Canning Machinery—A detailed description of canning machinery is contained in a 30-page illustrated booklet issued by the Ayars Machine Co., Salem, N. J.

Industrial Paint—A 12-page booklet published by the U. S. Gutta Percha Paint Co., Providence, R. I., explains how Barrelled Sunlight paint answers an industrial problem.

Motor Trucks — Illustrations of Mack trucks in the dairy, ice cream, bottling, and ice industries, and description of the exclusive features of these trucks are contained in a 68-page booklet issued by Mack Trucks, Inc., 25 Broadway, New York City.

Temperature Indicating Instruments — The 1931 Tycos catalog of instruments for use in canning, packing, and preserving has been issued by the Taylor Instrument Cos., Rochester, N. Y.

Unit Ventilators and Propeller Fans—Catalogs No. 377 and 385, prepared by B. F. Sturtevant Co., Hyde Park, Boston, Mass., describe in detail the unit ventilator and a new line of propeller fans.

Indicating Thermometers — Bulletin No. 148-2, a 32-page illustrated booklet issued by the Foxboro Co., Foxboro, Mass., describes each type of indicating thermometer and also contains information on dials, ranges, bulbs, tubing, gage boards, and other details.

Alloy Steel Castings—An illustrated 8-page booklet prepared by the Duriron Co., Inc., Dayton, Ohio, contains a chemical analysis of Durimet and Durco Nirosta (alloy steel castings), and a table of resistances to various chemicals.

Canning Equipment—Description of the Pugh green fruit grader, universal and economy washers, pear peeler, and similar equipment is contained in a leaflet issued by C. F. Pugh & Co., 550 South 21st St., Salem, Ore.

Pasteurizers, Case Washer, and Conveyors—Three circulars describing and illustrating pasteurizers, bottle case washer, and conveyors have been prepared by the Mojonnier Bros. Co., 4601 West Ohio St., Chicago, Ill.

Dairy Equipment—Descriptions of a can washer and dryer operating at the rate of 120 cans and covers per hour; an automatic can dumping machine, capacity 720 cans per hour; and a ball and socket power chain conveyor are contained in three illustrated pamphlets issued by the Lathrop-Paulson Co., 2459 West 48th St., Chicago, Ill.

Shifting in Cars Prevented—A leaflet issued by the Wyric Engineering Co., Wyandotte, Mich., contains a description and illustrations of the use of the wedge-lock, a device to protect merchandise against damage in transit.

Dairy Plant Conveyor—A conveyor for the dairy industry is described and illustrated in a leaflet prepared by the Mechanical Handling Systems, Inc., 3454-70 Denton Ave., Detroit, Mich.

Ice Cream Can Lifter—The Griptite ice-cream can lifter, a simple hand-operated device which lifts on the center of gravity, is described in an illustrated leaflet issued by the Joe Lowe Corp., Bush Terminal, Bldg. 8, Brooklyn, N. Y.

Dough-Molding Machine—An 8-page illustrated circular prepared by the Century Machine Co., 4434 Marburg Ave., Cincinnati, Ohio, contains a detailed description of a drum-type molder.

Mechanical Dispersion—The application, construction, advantages, and specifications of the Disper-Mill, for use in mechanical dispersion, deflocculation, emulsification, and homogenization are described by the Diamant Tool & Mfg. Co., 401 Mulberry St., Newark, N. J., in a 4-page circular.

Flexible Conveyor Chain — A conveyor chain that curves sidewise, known as the Universal No. 77 chain, is described in a leaflet issued by the Link-Belt Co., 300 West Pershing Road, Chicago, Ill.

NEWS OF THE MONTH

I.C.C. Plan Hits Manufactured Foods; Other Freight-Rate Changes Proposed

By Paul Wooton
Washington Correspondent

DESPITE exemption of the major farm products, foodstuffs and related commodities must contribute about $14,000,000, or 11.5 per cent, if the $125,000,000 advance in freight rates proposed by the Interstate Commerce Commission becomes effective. This estimate is based upon carload tonnage shipped in the year ended June 30 last, and does not include less-than-carload traffic that also is subject to increases on hauls over 175 miles.

As between raw and processed food products, the latter will bear the greater portion of the advance in rates. In general, the raw products take an increase of 1c. per 100 lb. for a total of approximately $4,700,000. Nearly half of this total is contributed by fertilizer, stock feed, and ice. Canned and other processed foods are subject to an increase of 2c. per 100 lb. for a total of $9,300,000, including such collateral products of the food industries as soap and tobacco.

Exempting short-haul l.c.l. shipments from a rate increase is expected to prevent any considerable diversion of tonnage to trucks. Through shipments, including those moving on a combination rate, will take only one increase. Products stored or processed in transit probably will be subject to special adjustment, but this and other details will be worked out later. All increases in rates are subject to agreement by the railroads by Dec. 1 on a plan for distributing the additional revenue among roads not now earning their interest charges, their latest suggestion calling for loans, rather than an outright pooling agreement. Increases would be limited to a period ending March 31, 1933.

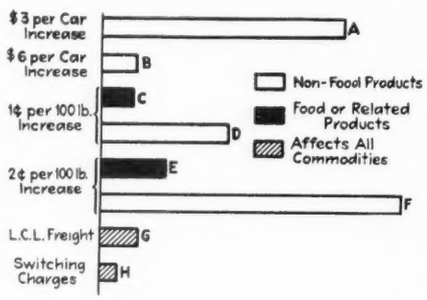
The I.C.C. denied Nov. 17 a petition of the western and southwestern lines for reopening of its order effective Jan. 25, reducing rates on livestock by placing western trunk line and southwestern territories on the same level. The reduction in the Southwest is estimated at 6 per cent. The carriers contended that the rates prescribed for all territories east of the Rocky Mountains are unreasonably low for the Southwest, and asked revision upward, pointing out that in the grain case the I.C.C. prescribed a higher level of rates in southwestern territory than in the western trunk line territory, and in the class rate case ordered lower rates in western trunk line territory than previously applied in the Southwest.

Forced localization of the can manufacturing industry is put up as the principal objection to an upward revision of rates and minimum carload weights on metal containers recommended to the I.C.C. by Examiners J. P. McGrath and W. H. Smith. Armour & Co. asserts that the high rates will hasten the demise of tin can traffic. The company pointed to installation of its own can fabricating machinery at Fort Worth and Oklahoma City following rate increases in the Southwest and predicted that many other canners will adopt the same expedient. The Evaporated Milk Association argues that higher rates will bring about relocation of can manufacturing plants and drive much of this tonnage to trucks.

Referring to packers' cans and the general line of containers, the Tin Can Club contends that increases resulting from the ratings of 50 per cent of first class (minimum 16,000 lb.) and 70 per cent of first class (minimum 10,000 lb.) are not justified. These manufacturers argue that the ratings finally prescribed should be uniform in all territories.

The Wisconsin Canners' Association, as well as Procter & Gamble Co., contends that there is no necessity for separating the types and sizes of tin cans by commodity descriptions.

Effect of Proposed Freight Rate Increases on Food and Allied Products



Proposed Increase (See chart)	Products Affected	Expected Additional Charges (July 1, '30–July 1, '31 Basis)
A.	No food or related products subject to this increase	$35,900,000
B.	No food or related products subject to this increase	5,000,000
C.	Oranges and grapefruit	400,000
	Other citrus fruits	40,000
	Cantaloupes and melons	90,000
	Watermelons	130,000
	Cabbage	100,000
	Onions	100,000
	Tomatoes	70,000
	Other fresh vegetables	360,000
	Dried vegetables	50,000
	Dried and evaporated fruits	120,000
	Peanuts	50,000
	Farm products not otherwise specified	720,000
	Cottonseed meal and cake	430,000
	Vegetable-oil cake and meal	80,000
	Fertilizer	1,700,000
	Ice	260,000
	Total (food group)	$4,700,000
D.	Other (non-food) carload freight subject to increase of 1c. per 100 lb.	18,600,000
E.	Cereal foods	320,000
	Canned foods	1,900,000
	Packing house products, edible	450,000
	Sugar, molasses and syrup	2,120,000
	Fresh meats	1,180,000
	Cured, dried and smoked meats	290,000
	Butter	230,000
	Cheese	85,000
	Eggs	240,000
	Dressed poultry	110,000
	Live poultry	55,000
	Vegetable oils, including linseed and cottonseed	610,000
	Fish oil	40,000
	Margarine and butterine	15,000
	Beverages	355,000
	Bananas and other tropical fruits	410,000
	Soap and washing compounds	440,000
	Leaf tobacco	380,000
	Manufactured tobacco	70,000
	Total (food group)	$9,300,000
F.	Other (non-food) carload freight increased 2c. per 100 lb.	44,100,000
G.	L.C.L. freight increased 1c. per 100 lb. beyond 175, including 250 miles; 2c. per 100 lb. beyond 250 miles	5,400,000
H.	Switching charges increased 10 per cent	2,000,000
	Total	$125,000,000

Revise Southern Rates On Canned Food

A sweeping revision of freight rates on canned goods to, from, and in the South has been authorized by the Interstate Commerce Commission. On the assumption that the bulk of the traffic consists of lower grade products, the railroads have adopted seventh class rates, minimum 36,000 lb., which are 35 per cent of first class, as the basis for all traffic, except to Florida destinations, instead of dividing the list into two classes, as has been done in other territories.

Effective in the near future, the new rate schedules will replace carload commodity rates, which are in a chaotic condition. The proposed rates, according to the Commission, are generally lower than the rates now in effect on canned goods between points in the South. Substantial reductions will apply to destinations in the South from points in eastern territory, Ohio River crossings, Virginia cities, South Atlantic ports and Gulf ports.

Dairy Engineers Meet At Atlantic City

The third Annual Dairy Engineers' Institute, a gathering of designers and technologists primarily concerned with dairy equipment, met in the Atlantic City Auditorium on Oct. 29 in connection with the Dairy Industries Exposition. Sponsored by the committee on dairy engineering of the American Society of Agricultural Engineers, the meeting brought to light a number of points valuable to users, as well as makers, of dairy equipment.

Following the opening address by H. H. Miller, president of the Dairy and Ice Cream Machinery and Supplies Association, Dr. A. C. Dahlberg, of the New York State Agricultural Experiment Station, pointed out the relationship that exists between certain characteristics of dairy products and the design of the equipment in which they are held or processed. He maintained, for instance, that old and unscientific traditions as to the way cream rises in milk have led to faulty design of equipment, which, in turn, has influenced product quality. A vat pasteurizer-cooler in which agitation at about five times the normal rate produces rapid cooling will produce a vat-cooled milk of superior creaming quality, he held.

The properties of stainless steels as they affect the design, construction, and maintenance of dairy equipment were of outstanding interest to the group. L. W. Hostettler, Allegheny Steel Co., told of difficulties of fabrication, and C. M. Snyder, Republic Steel Co., told of the characteristics of such equipment that must be kept in mind by dairymen.

The need of economic foresight is one of the chief lessons to be gleaned from the depression, Dr. L. V. Burton, editor of FOOD INDUSTRIES, pointed out. As an example of how economic foresight can be of benefit, he indicated that the low price of non-food agricultural products in the South is forcing people of that district into food production. The industry must bear this in mind, he said, and try to prevent further overcapacity in those sections from which there is likely to be a trend to southern sources.

At the afternoon session, Dr. H. W. Jeffers, president of Walker-Gordon Laboratories, told of the advantages in production of certified milk that have resulted from the use of the "Rotolactor." Quick hardening of ice cream (FOOD INDUSTRIES, Vol. 3, p. 182, May, 1931) was discussed by Dr. A. H. Bayer, General Ice Cream Co., Albany, N. Y. Dealers may destroy, by improper handling, the improvement in quality that quick hardening produces, it was shown.

COMING EVENTS

DECEMBER

1—American Association of Creamery Butter Manufacturers, Palmer House, Chicago, Ill.
4—National Dairy Association, Palmer House, Chicago, Ill.
7-9—American Farm Bureau Federation.
9-11—American Institute of Chemical Engineers, Chalfonte-Haddon Hall Hotel, Atlantic City, N. J.

JANUARY

4-6—Northwest Canners' Association, Washington Hotel, Seattle, Wash.
15—Eastern Confectioners' Traffic Bureau, New York, N. Y.
19-22—Western Fruit Jobbers' Association of America, Roosevelt Hotel, New Orleans, La.
24—Western Confectioners' Association, Coronado, Calif.
25-27—National Preservers' Association, Congress Hotel and Annex, Chicago, Ill.
25-28—National Canners' Association, Hotel Stevens, Chicago.
25-29—National Food Brokers' Association, Hotel Stevens, Chicago.
25-29—Canning Machinery and Supplies Association, Hotel Stevens, Chicago.
27—National Pickle Packers' Association, Chicago.

Upward Turn of Business Delayed

Despite governmental efforts to rejuvenate business conditions and despite the definite upturn of commodity prices during the last week of October, the middle of November finds business conditions seeking new low levels.

The Business Week indicates general business conditions to be 66.2 per cent of normal for the middle of November. This index for the middle of October was 70.2 per cent. A weighted price index shows a decline of 9.3 and 3.11 per cent, respectively, in general commodity and average food prices for the week ending Nov. 21, as compared with those of the week ending Oct. 24.

For the month ending Oct. 15, the average wholesale price for all commodities showed a decrease of 1.01 per cent, making a total decrease of 17.19 per cent for the 12-month period. Average wholesale food prices declined 0.41 and 18.06 per cent, respectively, for the same periods. *The Annalist's* wholesale index reflected a decline of 2.0 per cent in food prices during the month ending Nov. 3. For the month ending Oct. 15, wholesale prices for dairy foods had an upturn of 1.9 per cent, but butter and milk prices were lower in eastern districts as of Nov. 1.

Retail food prices in 51 cities during the month ending Oct. 15 were lower by 0.33 per cent, making a total decline of 17.5 per cent for the 12-month period. A national food retail organization reports an increase of 8.93 per cent in tonnage sales and a decrease of 5.41 per cent in dollar sales during the month ending Oct. 31, in comparison with the month of October, 1930.

In the general index of employment and payroll totals, the food industries present a more favorable condition than do manufacturing industries as a whole. Employment index for all industries show decreases of 14.38 and 3.3 per cent, respectively, for the 12- and the 1-month periods ending Oct. 15, with corresponding decreases of 26.16 and 3.07 per cent in payroll totals. The food industry totals declined 5.82 and 0.44 per cent for employment, with 12.82 and 1.76 per cent for payroll during the same respective periods.

Meat packing slightly increased its employment but decreased its payroll totals, whereas baking showed no change in employment but a 0.84 per cent increase in payroll totals. Confectionery had seasonal increases of 4 per cent in employment and 8.3 per cent in payroll totals. However, these respective totals were 2.41 and 4.18 per cent lower than for the same period in 1930.

Bottlers Plan to Resist Tax Discrimination

Cooperative effort to resist the dangers of discriminatory tax legislation was urged upon members of the American Bottlers of Carbonated Beverages by President Virgil Browne at the opening session of the Dallas (Texas) convention on Nov. 11. Showing that the net profit of 80 per cent of bottlers throughout the United States is about 5c. per case of 24 bottles, he indicated that any tax valuable for revenue purposes would lead to an increase in retail selling price.

Despite elimination of many non-essentials from the purchases of those affected by the depressed conditions carbonated beverages have generally maintained a satisfactory position, according to Junior Owens, secretary of the association. This constitutes proof, Mr. Owens maintained, that carbonated beverages have become staple food elements, rather than luxuries, and ought not to be regarded as possible subjects for luxury sales taxes. Dr. Edward R. Cary, president-elect of the American Medical Association, reinforced Mr. Owens' attitude by emphasizing the health value of pure carbonated beverages.

"Experience" sessions, devoted to technical problems of the industry, also received considerable attention. Ninety per cent of beverage spoilage is due to syrup and bottling room practice, Dr. Max Levine, of the A.B.C.B. Fellowship, said. He urged that greater attention be given to syrup and bottling department equipment. A standard score card which will enable bottlers to rate their own plants on a percentage basis is in the course of preparation. Other "experience" sessions featured beverage analysis, water supply, relation of flavor to ingredients and process control.

Recommend Loose Milk Ban For New York City

Loose milk is a potential health hazard, and its sale at retail ought to be prohibited, a commission of prominent health authorities and citizens interested in social welfare has reported to Health Commissioner Shirley W. Wynne, of New York City, following an extended study. Because of present disturbed economic conditions, however, it was recommended that enforcement of the ban be postponed until Jan. 1, 1933.

The commission held that no means except elimination of loose milk in retail trade would effectively remove the potential hazard. For hospitals, institutions, and for cooking and manufacturing purposes, a provision permitting distribution of milk in full 40-qt. or 20-qt. cans filled and sealed at the pasteurizing plant was advocated. The commission also held that higher standards of sanitation in stores and restaurants should be set up and enforced.

Milk Bread, Mayonnaise, and Beverages Defined

The Secretary of Agriculture signed on Nov. 10, new and revised definitions for mayonnaise, milk bread, farina macaroni, ginger ale, and for other foods and beverages, approving the recommendations of the Food Standards Committee which met in Washington Oct. 26 to 31. These definitions are adopted as an aid to officials in enforcing federal and state food laws.

Definitions adopted for mayonnaise, milk, bread, ginger ale, and sarsaparilla are revisions of previous definitions. All other definitions are new. The definition for rye bread, which has been in effect for a number of years, was dropped and is no longer official.

The full text of the definitions follows:

MAYONNAISE, MAYONNAISE DRESSING, MAYONNAISE SALAD DRESSING is the semi-solid emulsion of edible vegetable oil, egg yolk, or whole egg, a vinegar, and/or lemon juice, with one or more of the following: salt, other seasoning commonly used in its preparation, sugar and/or dextrose. The finished product contains not less than 50 per cent of edible vegetable oil.

MILK BREAD is the product, in the form of loaves or smaller units, obtained by baking a leavened and kneaded mixture of flour, salt, yeast, and milk or its equivalent (milk solids and water in the proportions normal to milk); with or without edible fat or oil, sugar and/or other fermentable carbohydrate substance. It may also contain diastatic and/or proteolytic ferments, and such minute amounts of unobjectionable salts as serve solely as yeast nutrients. (The propriety of the use of minute quantities of oxidizing agents as enzyme activators is reserved for future consideration and without prejudice.) The flour ingredient may include not more than 3 per cent of other edible farinaceous substance. Milk bread contains, one hour or more after baking, not more than 38 per cent of moisture.

FARINA MACARONI, FARINA SPAGHETTI, VERMICELLI are plain alimentary pastes in the preparation of which farina is the only farinaceous ingredient used and are distinguished by their characteristic shapes.

GINGER ALE is the carbonated beverage prepared from ginger ale flavor, harmless organic acid, potable water and a syrup of one or more of the following: sugar, invert sugar, dextrose; with or without the addition of caramel color.

GINGER ALE FLAVOR, GINGER ALE CONCENTRATE is the beverage flavor in which ginger is the essential constituent, with or without aromatic and pungent ingredients, citrus oils, fruit juices, and caramel color.

SARSAPARILLA is the carbonated beverage prepared from sarsaparilla flavor, potable water, and a syrup of one or more of the following: sugar, invert sugar, dextrose; with or without harmless organic acid, and with or without the addition of caramel color.

SARSAPARILLA FLAVOR is the beverage flavor prepared from oil of sassafras and methyl salicylate (or oil of wintergreen or oil of sweet birch), with or without other aromatic and flavoring substances and caramel color. It derives its characteristic flavor from oil of sassafras and methyl salicylate.

ROOT BEER is the carbonated beverage prepared from root beer flavor, potable water and a syrup of one or more of the following: sugar, invert sugar, dextrose; with or without harmless organic acid, and with or without the addition of caramel color.

ROOT BEER FLAVOR, ROOT BEER CONCENTRATE is the beverage flavor in which oil of sassafras and methyl salicylate (or oil of wintergreen or oil of sweet birch) are the principal flavoring constituents, and contains other flavoring substances, with or without the addition of caramel color.

BIRCH BEER is the carbonated beverage prepared from birch beer flavor, potable water, and a syrup of one or more of the following: sugar, invert sugar, dextrose; with or without harmless organic acid, and with or without the addition of caramel color.

BIRCH BEER FLAVOR, BIRCH BEER CONCENTRATE, is the beverage flavor in which methyl salicylate (or oil of sweet birch or oil of wintergreen) and oil of sassafras are the principal flavoring constituents, with or without other flavoring substances, and with or without caramel color. The flavor of methyl salicylate predominates.

CREAM SODA WATER, "CREAM SODA," is the carbonated beverage prepared from cream soda water flavor, potable water and a syrup of one or more of the following: sugar, invert sugar, dextrose; with or without harmless organic acid, and with or without the addition of caramel color.

CREAM SODA WATER FLAVOR, CREAM SODA WATER CONCENTRATE, is the beverage flavor prepared from vanilla, tonka, vanillin, or coumarin, singly or in combination, together with other flavoring substances; with or without the addition of caramel color.

Release Comparative Stock Figures on Canned Foods

The first quarterly comparison of canned food stocks in the hands of canners and distributors was made possible when the Foodstuffs Division of the Bureau of Foreign and Domestic Commerce released Oct. 1 figures. The figures given in the tables below are not total stocks for any item, the Bureau report points out, but represent the change in holdings based on a cross-section of canners and distributors throughout the country.

Attention is called to the fact that the surveys have still not been carried over a sufficient period to reveal their true value. The Jan. 1 comparison, for instance, will be more valuable because intervening packs will not disturb the measure of movement of canners' stocks during the remainder of the crop year.

A summary of the data is shown in the tables below:

Stocks in Hands of Canners, July 1, 1931, and Oct. 1, 1931

(Based on reports for the same firms for each date)

Commodity	Number of Firms Reporting	Total Stocks (Except Where Otherwise Indicated) July 1 *Cases**	Total Stocks (Except Where Otherwise Indicated) October 1 *Cases*	Increase, October 1 over July 1 Amount *Cases*	Increase, October 1 over July 1 Per Cent
Tomatoes**	329	2,282,736	1,534,077††	748,659†	33†
Peas	135	2,164,281††	6,907,725	4,743,444	219
Corn	168	1,587,025	10,988,790	9,401,765	592
Green and wax beans	218	1,432,509	3,872,694	2,440,185	170
Peaches	55	3,069,004	6,928,637	3,859,633	126
Pears	74	722,639	2,380,505	1,657,866	229
Pineapple	9	2,383,757	6,490,813	4,107,056	172
Salmon	32	533,705	2,391,085	1,857,380	348

*Total cases of all sizes are given for each item without any reduction to a standard size. For all products but tomatoes, this makes no important difference. In the instance of tomatoes, the 1930 pack on the basis of No. 3's amounted to 17,000,000 cases, while about 24,250,000 cases of all sizes were packed. In analyzing the tomato situation, the latter figure should be used.

**Due to the fact that the tomato pack was far from completion on Oct. 1, it was thought desirable to collect only old pack stock figures on this product as of that date. The collection of total stock figures, including 1931 pack stocks, for the other items, prevents the showing in this report of any rate of movement for them. Three hundred and twenty-nine canners have reported a reduction of 33 per cent in their stocks of 1930 pack tomatoes between July 1 and Oct. 1. Since the distributors' stocks were practically unchanged during that period, the reduction represents the movement into consumption.

†Decrease.

††Does not include any 1931 pack stocks.

Stocks in Hands of 505 Distributors, July 1, 1931 and Oct. 1, 1931

(Based on reports from the same firms for each date)*

Commodity **	Total Stocks July 1 *Cases*	Total Stocks October 1 *Cases*	Increase, October 1 over July 1 Amount *Cases*	Increase, October 1 over July 1 Per Cent
Tomatoes	1,316,038	1,324,617	8,579	0.7
Peas	1,086,050	1,195,717	109,667	10.1
Corn	988,985	1,113,147	124,162	12.6
Green and wax beans	549,650	629,762	80,112	14.6
Peaches	461,757	527,458	65,701	14.2
Pears	177,566	168,592	8,974†	5.1†
Pineapple	475,565	483,702	8,137	1.7
Salmon	370,780	358,888	11,892†	3.2†
Total, above eight items	5,426,391	5,801,883	375,492	6.9

*Since publishing the first progress report on this survey, an additional number of chain stores has agreed to cooperate and the Jan. 1-Oct. 1 comparisons will include their stocks. This will represent an increase of about 30 per cent in the number of retail outlets controlled by chain stores over the number in the present report.

**The distributors reporting have increased their holdings of these eight items by nearly 7 per cent. The movement of the different individual products varies to some extent with the availability of the 1931 packs. Next year's figures, having those in the current report as a comparative background, should show whether prices, supplies and market conditions directly affect the stock position of the distributors.

†Decrease.

Ice Cream Makers Discuss Competition; Hear of Production Problems

FAVORABLE weather conditions for the sale of ice cream during the past two summers have offset to a considerable extent the effect of general business conditions, in the opinion of C. R. Lindback, president of the International Association of Ice Cream Manufacturers. Speaking at the opening meeting of the Atlantic City convention on Oct. 26, he held that economic conditions in the industry are reasonably good, despite a drop of 14 per cent in the industry's sales volume.

Price cutting and other forms of destructive competition arising from the overproductive capacity of the industry are the chief difficulties at present, Mr. Lindback brought out. Competition for retail outlets, he said, has led to unsound merchandising for which cooperation between competing manufacturers is the only remedy. He urged adoption of the ethics of the market milk industry, which discourage efforts to hire dealers away from other manufacturers.

In contrast with other opinions, Dr. O. E. Reed, chief of the Bureau of Dairy Industry, U. S. Department of Agriculture, maintained that the dairy farmer is now in a relatively stronger economic position than other factors in the industry. Factual information upon which point of view is based has been published in Bulletin No. 124 of the Bureau. Trends to be reckoned with in the immediate future include the increase in cow population of 4 per cent during the past year, and a continued increase in this rate. One pound of butter fat will buy more feed for animals than in any previous time in the past twenty years, Dr. Reed pointed out. Although he made no forecast, it was quite evident that competition in selling dairy products will be markedly increased.

An increase in the number of ice cream plants at a rate far above increase in population or consumption presages difficult times ahead, according to Fred Rasmussen, secretary of the association, who spoke on competition and prices. Improvement in quality rather than lowering of price is, in the long run, the most satisfactory way to meet difficult competitive conditions, he held. If necessary, a "second line" product competing on a price basis may be used to fight the price-cutter on his own ground.

Edwin B. George, of the U. S. Department of Commerce, presented a preliminary report on the St. Louis drug store survey. A four-point plan for improving business stability given by Earl Whitehorne, of the McGraw-Hill Publishing Co., was received with enthusiasm. Establishment of real funded reserves, in place of meaningless bookkeeping reserves ought to be set up to maintain continued sales effort and employment in depressed times and to provide for depreciation, he maintained, and a more conservative dividend policy established.

In a symposium on the use of frozen cream in ice cream manufacture at the production and laboratory section meeting Prof. M. J. Mack, of the Department of Dairy Husbandry, Massachusetts State College, indicated that preservation of cream by this method was entirely satisfactory, but that holding time should be less than six months at 0 deg. F. Adding 10 per cent of sugar to the cream before freezing was generally advantageous.

Defects in flavor, particularly of strawberry ice cream, were also a center of discussion. P. H. Tracy, of the University of Illinois, recommended heating the strawberries to 175 deg. F. to destroy enzymes and other substances that catalyze flavor defects. Copper contamination and quality of condensed milk also affect flavor, it was shown.

A discussion of equipment on display at the Dairy Industries Exposition was an interesting part of the convention program. Some of this equipment has been described in FOOD INDUSTRIES in recent months, and other new developments will be treated in the "New Equipment" sections of coming issues.

Center of Interest for Dairy Groups

They Learned About Bunnies

Certain promoters have been taking their Easter legends too seriously, according to the Food and Drug Administration. Never doubting that bunnies hatched from eggs, they could see nothing wrong in labeling canned rabbit meat as "chicken a la king."

But Dr. P. B. Dunbar, assistant chief of the administration, felt that promoters should know the facts of life. Besides, this is the Christmas season, not Easter, and Dr. Dunbar is no Santa Claus. "Any attempt to sell canned rabbit meat as canned chicken," he has announced, "will result in immediate regulatory action. . . . ." Canned rabbit is to be sold only as canned rabbit, whatever the promoter may have learned at his mother's knee.

Milk Dealers Stress Sales At Atlantic City Meeting

Concentration on efforts to increase milk sales in spite of the depression attracted to the Atlantic City convention of the International Association of Milk Dealers the largest number of delegates in the history of the group. As in other meetings among the dairy industries during the week of Oct. 26-31, the need for ethical cooperation, rather than bitter competition, was emphasized as one of the most important steps for bringing the industry through trying times in satisfactory condition.

Advertising of milk as a pleasant beverage for adults, rather than as a health necessity for children, ought to be seriously considered by milk dealers, Shirley W. Wynne, New York City Health Commissioner, pointed out.

In the meeting of the plant section, the latest developments in flash pasteurization were described by George W. Putnam, of the Creamery Package Manufacturing Co., Chicago, Ill. Causes and remedies of the etching and scratching of milk bottles were discussed by Joseph Jones, 3d, Supplee-Wills-Jones Milk Co., Philadelphia, Pa., and Harold Wieland, Wieland Dairy Co., Chicago, Ill., spoke on transporting bottled milk

to distribution stations. Other subjects up for discussion included effect of operating conditions on corrosion of equipment, moving milk by air, product control, and plant aid to increased sales.

A significant point of the sales and advertising section meeting was the general agreement that the sale of fruit juices in connection with dairy routes has been universally unsuccessful.

Dr. Milton J. Rosenau, professor of preventive medicine and hygiene at Harvard University Medical School, brought out the progress of pasteurization at the annual banquet of the milk dealers. Contrary to the situation in former times, he maintained, the larger cities now provide the most certain supply of pure and wholesome milk. A motion picture concerning the life of Dr. Stephen Moulton Babcock also was a feature of the banquet.

Forty-one specific suggestions for better business conditions in the dairy industry were presented to the convention by F. A. Webb, Borden's Farm Products Co., Chicago. Among them were reduction of bottle losses, daylight deliveries, reduction of returns, motorization of delivery, modernization of equipment, and proper accounting methods.

New officers elected included C. F. Whiting, of Whiting Milk Cos., Boston, Mass., who succeeds Dr. F. D. Walmsley as president; L. A. Van Bomel, Sheffield Farms Co., New York, N. Y., re-elected vice-president; Dr. D. B. Peck, Bowman Dairy, Chicago, Ill., re-elected treasurer; and R. E. Little, Chicago, re-elected executive secretary.

TRADE NOTES

BUCKERFIELD'S, LTD., has put into operation a new corn cereal plant at Buckerfield Mills, Vancouver, B. C. The plant is the only one of its kind in western Canada.

CALIFORNIA CARBONIC ICE CO. plans a 50-ton solid CO_2 plant at San Francisco. It will use the stack gases of the Pacific Gas & Electric Co.'s power plant as a source of CO_2.

CAPITAL RABBIT MEAT PACKERS has been organized at Taylorville, Ill., with a capital of $150,000 to raise rabbits and pack and sell rabbit meat. James A. Hough, Forrest Cutler, D. F. Rinisa and William J. Fitzpatrick are the organizers.

CUDAHY PACKING CO. is buying cotton in amount equal to 10 per cent of its sales in the South in order to create a cash market for the crop. Purchases continued between Sept. 1 and Dec. 1 of this year.

ENGINEERING & TRADING CORP., 136 Liberty St., New York, N. Y., has completed arrangements with M. T. Zarotschenzeff, inventor of the "Z" process of rapid chilling, freezing, and defrosting, to handle the process in the United States and Canada. The process is already in commercial operation in Europe. A demonstration plant has been installed in New York. Arrangements are also being made to import fish delicacies preserved by this method from England.

FAIRMONT CREAMERY CO., Columbus, Ohio, has just completed a program of expansion which includes the establishment of two manufacturing departments in the Columbus plant and the installation of a branch ice cream sales plant at Chillicothe, Ohio. The new departments will be devoted to the manufacture of a new line of food products, including French dressing, Thousand Island dressing, mayonnaise, salad dressing, and sandwich spread.

GENERAL FOODS CORP. has announced establishment of the sixth production unit for quick-freezing foods by the Birdseye process. It is located at the plant of the HANSON PACKING CO., Butte, Mont. Installation is being directed by engineers of the BIRDSEYE PACKING CO., General Foods affiliate; operation is expected to begin about Dec. 15.

G. & W. HELLER CO. has protested to the Better Business Bureau of New York City because an advertisement of LOFT, INC., in New York newspapers is regarded as a "vicious attack" on foreign candies, and, by implication, an attack on the United States Government for permitting importation of such candies. The Loft advertisement alleged that, following a chemist's report on some imported candies, "The Chief said: 'Throw them into the river.' Imported chocolates are not good enough for Loft customers." This is a "blanket implication," according to G. & W. Heller, against all foreign candies regardless of price or quality.

MCCORMICK & CO., Baltimore, Md., spice and tea packer, has recently released a motion picture film, "Spicy Travels," featuring the gathering and packing of spices and tea.

NATIONAL MACARONI MANUFACTURERS' ASSOCIATION has decided to terminate its four-year advertising plan and release members from pledges of funds. An attempt has been made by the MILLIS ADVERTISING CO., agent for the cooperative campaign, to put the association in the hands of receivers.

PIERCE BAKING & FOOD LABORATORIES, INC., has been chartered to establish and operate a baking plant and factory for the manufacture of food specialties at Rochester, N. Y. BLEIER'S WHITE STAR BAKING CO. also has recently been established at Rochester, N. Y.

STANDARD OIL CO. OF CALIFORNIA has withdrawn from its cooperative arrangement with GENERAL FOODS CORP. for the promotion of Birdseye frosted foods on the West Coast. Although a licensing plan was contemplated involving refrigerating plant subsidiaries of the California oil company, a survey revealed that a single organization more directly concerned with food production could best carry on the work. BIRDSEYE PACKING CO., General Foods affiliate, will assume control of the operations.

SWIFT & CO., Chicago, Ill., has acquired control of JOHN P. SQUIRE & CO., Cambridge, Mass., and the NORTH PACKING & PROVISION CO., Somerville, Mass. Swift has had a considerable interest in both these organizations for some time. Each is capitalized at $3,000,000.

TEXACO PRODUCTS CO., a subsidiary of the TEXAS CO., is now marketing table salt produced as a byproduct of oil well salt water from Texas Co. wells. A national sales campaign is planned.

PERSONAL

WILLIAM P. ALLEN, Wilmington, Del., a director and a member of the executive committee of the Childs Co., was recently elected president. He fills a vacancy that has existed for over a year since the resignation of WILLIAM CHILDS. Mr. Allen resigned as a vice-president of E. I. du Pont de Nemours & Co. to accept the new responsibility.

C. W. BIELFUSS, for many years connected with Libby, McNeill & Libby, has been named general manager of the E. K. Pond Co., Chicago manufacturer of peanut butter and food specialties. He succeeds the late GEORGE CASE.

FRANCIS CHILSON, consulting production and packaging engineer, has instituted a special group consulting service for manufacturers whose annual sales are less than $500,000. The cooperative plan will provide specific consulting service on the particular problems of each manufacturer at a lower cost than individual consulting service would require.

MARTIN DORST, superintendent of the Plymouth (Wis.) plant of the Kraft-Phenix Cheese Corp., has taken a similar position at the Freeport plant following the closing of the Plymouth plant.

H. M. FOSTER, recently editor of the food department of the New York *Journal of Commerce*, has joined the research department of Erwin, Wasey & Co., New York advertising agents. For ten years, Mr. Foster was secretary and general manager of the New York Wholesale Grocers' Association, and he has also been connected with the New York City Department of Health.

HARRY E. GORESLINE, who recently joined the food research staff of the Bureau of Chemistry and Soils, U. S. Department of Agriculture, is continuing the bureau's extensive investigations on vinegar, pickle, and sauerkraut fermentations begun by EDWIN LEFEVRE more than ten years ago but interrupted by Dr. LeFevre's sudden death in 1929. Dr. Goresline goes to Washington from the engineering experiment station at Iowa State College, Ames, Iowa, where for five years he was actively engaged in a study of the treatment of dairy and trade wastes by

fermentation. He has had wide experience in both the chemistry and microbiology of large-scale fermentations.

ROBERT W. GRIGGS, formerly in charge of sales of Royal gelatine desserts and Fleischmann's foil yeast for Standard Brands, Inc., is now advertising manager of the parent company. He will assist DANIEL P. WOOLEY, vice-president in charge of sales.

A. F. HAVEN is now sales director of W. R. Roach & Co., Grand Rapids, Mich., operator of a large number of fruit and vegetable canneries in that state. He succeeds the late G. GALE SIGNOR, who died on Sept. 17. Before joining W. R. Roach & Co., Mr. Haven was district sales manager in Chicago for the Van Camp Co., and had previously been with Franklin Food Products Co., Franklin, Ind.

J. W. HINES has been elected a vice-president of the Ward Baking Co.

F. HONEY has been appointed manager of the Vancouver (B. C.) branch of the Coca Cola Co., Ltd. He succeeds R. KEAST, who has been transferred to Atlanta, Ga.

R. T. MOHAN has been appointed superintendent of Richard Hellmann, Inc., Toronto, Ont. He holds a similar position at the Douglas-Pectin plant in Cobourg, Ont., another Canadian subsidiary of General Foods Corp.

H. C. PARMELEE, editorial director of the McGraw-Hill Publishing Co., and editor of FOOD INDUSTRIES from its inception in October, 1928, until November, 1930, was elected a vice-president, effective Nov. 2, 1931. Dr. Parmelee has served as editorial director of the organization since 1928; previously he was editor of *Chemical and Metallurgical Engineering*. He has been connected with the company in various editorial capacities for more than twenty years.

T. H. POWELL was named general sales manager of the California Fruit Growers' Exchange on Oct. 28. He has been with the organization since 1900. DALE R. KING, formerly manager of the Northern Orange County (Calif.) Citrus Exchange, has been made assistant general manager of the Fruit Growers' Exchange.

S. RENFRO, Chicago, Ill., has succeeded HOWARD E. HUNTLEY as manager of the Oklahoma City packing plant of Armour & Co.

GEORGE M. ROLPH, president of the California & Hawaiian Sugar Refining Corp., Ltd., has resigned from this position because of ill health. He has been in continuous service with the company for 25 years. He will continue as a member of the board of directors. A. M. DUPERU, vice-president in charge of production, has been appointed acting manager of the company.

N. L. SHORT, for the past year in charge of the cheese division of the Borden Sales Co. at Columbus, Ohio.

Blank & Stoller

H. C. Parmelee

has been promoted to sales manager of the cheese division for the State of Ohio, with headquarters in Cleveland.

BEECHER STARBIRD, for 39 years with Armour & Co., and for most of that time its general superintendent of the car route department, resigned Sept. 26. He originated the plan of car routes, and persuaded the company to adopt it, but at the time was considered too young to have charge, and so was made assistant at first. He will be succeeded by H. E. ANDRE, who has been his assistant for the past two years.

ROGER W. TRUESDAIL recently resigned his position as assistant professor of chemistry in Pomona and Claremont colleges, Claremont, Calif. He has now established a consulting and research practice in biological and nutritional chemistry with offices and laboratories in Los Angeles, Calif. Emphasis is to be placed upon vitamin investigations and byproduct utilization of foods.

T. C. TUCKER, president of the Almond Growers' Association, San Francisco, Calif., has been appointed a member of the California State Board of Agriculture.

PAUL S. WILLIS, president of the Comet Rice Co., has been elected president of the Associated Grocery Manufacturers of America. Other new officers include A. C. MONAGLE, vice-president of Standard Brands, Inc., who was elected a vice-president of the grocery organization.

OBITUARY

WILLIAM E. ADAMS, vice-president of the Rice Chicolate Co., Everett, Mass., died in New York, N. Y., about a month ago. He was 69 years of age and nationally known in the industry. For many years he was sales representative for H. O. Wilbur & Sons, Philadelphia, Pa.

EARL R. ALLURED, founder and publisher of *The Manufacturing Confectioner* and *The Confectionery Buyer*, died on Oct. 26 at Oak Park, Ill. His sudden death at the age of 43 was caused by a heart attack while rushing to the aid of his young son, who had been injured while at play. At the time of his death he was establishing a candy exhibit at the Merchandise Mart, Chicago, Ill.

CLINTON L. BAXTER, president of the Portland (Me.) Packing Co., died suddenly in New York, N. Y., two weeks ago while on a business trip. He was one of the most widely known canners in the East and a brother of Governor Percy Baxter of Maine.

GEORGE C. CARY, St. Johnsbury, Vt., former "maple-sugar king" and founder of the Cary Maple Sugar Co., died on Nov. 21 at the age of 67. At one time his business in maple sugar was the largest in the world. Recently he had met with financial reverses, having filed a petition in bankruptcy on Sept. 25.

PETER J. DIETRICH, head of a chain of New Jersey bakery shops bearing his name, died on Nov. 17 at his home in Elizabeth, N. J., at the age of 79. He was a native of Germany, but had resided in Elizabeth for nearly 50 years.

T. ELY, for many years secretary-treasurer of the American Milling Co., Peoria, Ill., died suddenly a few weeks ago.

FRED RONALD HAYWARD, president of the New England Confectionery Co. for the past eight years, died at his home in Newton Centre, Mass., on Nov. 28. Mr. Hayward was born in Cambridge, Mass., 58 years ago. He was a son of A. S. Hayward, of Forbes, Hayward & Co., one of the units which in 1900 united to form the New England Confectionery Co.

EMANUEL J. PETRU, head of the Petru American Importing Co., tea and coffee merchants, of Chicago, Ill., died Oct. 11 at his home at Fox Lake, aged 68 years. He came to America from Bohemia, and at the age of 22 organized the company which he headed at the time of his death.

JOSEPH PROBSTLE, vice-president and treasurer of the City Ice Co., Atlantic City, N. J., died on Nov. 15. He was 62 years of age. For 25 years he served as international secretary of the Brewery Workers' Organization.

GEORGE E. SPRINGER, for seventeen years general manager and secretary of the Alameda Sugar Co., died at Oakland, Calif., on Nov. 4. He was 58 years old. Mr. Springer was also chairman of the Cooperative Grain Growers of California. He was a former secretary of the Union Sugar Co. of Northern California.

ALBERT M. TODD, Kalamazoo, Mich., founder of A. M. Todd & Co., producer of peppermint and essential oils, died on Oct. 6 after an illness of two years. He was 81 years old and had retired several years ago to devote his time to rare books and paintings. In 1896 he was elected to Congress, serving one term.

NEW CONSTRUCTION

Bakery—Great Atlantic & Pacific Tea Co., 211 West Wacker Dr., Chicago, Ill., awarded contract for construction of a 3 story bakery at 47th and Kildare Sts., to E. W. Sproul, 2001 West Pershing Road, Chicago. Estimated cost $150,000.

Bakery—Hayes-Bickford Lunch System, Inc., 1040 Boylston St., Boston, Mass., awarded contract for a 1 and 2 story, 60 x 120 ft. bakery at 32 Garrison St. to W. A. and H. A. Root Co., 250 Stuart St., Boston. Estimated cost $40,000.

Bakery—Kroger Grocery & Baking Co., A. S. Grogg, Gen. Mgr., 3816 Shaw Ave., St. Louis, Mo. and 35 East Seventh St., Cincinnati, O., will receive bids about December 10 for a 4 story, 85 x 130 ft. bakery including garage, boiler room, etc., at 1311 South 39th St., St. Louis. Estimated cost $750,000. Emil H. Niemann, 3816 Shaw Ave., St. Louis, is architect.

Bakery—Owner c/o C. C. Bell, 8 South Ave., Cranford, N. J., Archt., having preliminary plans prepared for a 1 story bakery at Plainfield. Estimated cost $40,000.

Bakery—Stansbury Bakery, Orange, Tex., having preliminary plans prepared for construction of a bakery. Private plans. Machinery and equipment will be required.

Bakery Addition—Jacob Laub Baking Co., 4919 Lorain Ave., Cleveland, O., awarded contract for a 2 story, 50 x 130 ft. addition to bakery to Boldt-Rapp Co., 2175 Ashland Road, Cleveland. Estimated cost $60,000.

Bakery Addition—National Biscuit Co., 449 West 14th St., New York, N. Y., will receive bids about January 1 for addition to bakery. Estimated cost $500,000. Private plans.

Bakery, etc.—U. S. Treasury Dept., J. A. Wetmore, Acting Supervising Archt., Washington, D. C., will soon award contract for construction of a group of buildings including main building, acute building, mess hall, kitchen and bakery, etc., at Hospital for Defective Delinquents, Springfield, Mo. Estimated total cost $2,500,000.

Biscuit Factory—Loose Wiles Biscuit Co., 811 Commerce Bldg., Kansas City, Mo., completed plans for construction of first unit of factory, 1 story 80 x 250 ft. at Gage Ave. and Avalon Blvd. Estimated total cost $1,500,000. Baking, packing and shipping equipment will be required.

Bottling Plant—Canada Dry Corp., 423 East Eighth St., Los Angeles, Calif., plans construction of a bottling plant. Estimated cost $40,000.

Bottling Plant—Greensboro Coca Cola Bottling Co., Greensboro, N. C., will soon award contract for a 2 story, 78 x 120 ft. bottling plant. Estimated cost $75,000. Pringle & Smith, Norris Bldg., Atlanta, Ga., and J. J. Sawyer, Greensboro, are associate architects. W. C. Spiker & Co., Atlanta, Ga., are engineers.

Bottling Plant — Lakeside Bottling Co., E. Jansen, Gen. Mgr., 715 North 5th St., Sheboygan, Wis., awarded contract for a 2 story, 30 x 88 ft. bottling plant on Calumet St. to Wendt Bros. Co., 1907 Cooper Ave., Sheboygan.

Candy Factory—Edy Candy Co., 3315 Grand Ave., Oakland, Calif., awarded contract for a 2 story candy factory on Lakeshore Ave., to Lindgren-Swinerton, Inc., 225 Bush St., San Francisco. $40,000.

Canning Plant—H. C. Baxter & Bros., J. L. Baxter, Brunswick, Me., plans construction of a canning plant at Westminster, Vt. Estimated cost $40,000. Architect not selected.

Canning Plant — Felice & Perelli, Gilroy, Calif., having plans prepared for a 1 story canning plant. Estimated cost $40,000. W. Knowles, 1214 Webster St., Oakland, is architect.

Creamery Plant—Knowlton Creamery, c/o S. E. Knowlton, 1415 West Summit St., San Antonio, Tex., plans a 1 story creamery plant at 2200 Blk. Fredericksburg Road. Estimated cost $60,000. Private plans. Interested in complete equipment.

Creamery Plant—W. J. McKnight, Raymondville, Tex., plans construction of a 1 story creamery plant. Architect not selected.

Creamery—Western Holstein Farms Inc., 3402 Avalon Blvd., Los Angeles, Calif., plans construction of a 2 story, 150 x 150 ft. creamery at 31st St. and Grand Ave. Estimated cost $100,000.

Creamery and Dairy Barn—State Department of Public Works, Division of Architecture, Sacramento, Calif., will soon award contract for a creamery unit and dairy barn at Preston School of Industry, Ione.

Dairy Building, etc.—M. H. Renken Dairy Co., 584 Myrtle Ave., Brooklyn, N. Y., will soon award contract for construction of a 2 story dairy building, service garage and storage building at Classon St. and Myrtle Ave., Brooklyn. Estimated cost $40,000. Koch & Wagner, 32 Court St., Brooklyn, are architects.

Ice Cream Plant—Appleton Pure Milk Co., 714 West Washington St., Appleton, Wis., will soon award contract for construction of a 2 story 48 x 50 ft. ice cream plant. Estimated cost $40,000.

Ice Cream Plant—Ness Creameries, Clifton Cox, Mgr., Biloxi, Miss., completing plans for construction of a 1 and 2 story, 50 x 100 ft. ice cream plant at West Howard and Vallavet Sts. Estimated cost $50,000. Helfensteller, Hirsch & Watson, 1501 Chemical Bldg., St. Louis, Mo., are architects.

Ice Cream Factory—Michael Orfitelli, South Main St., Manchester, Conn., awarded contract for a 2 story, 25 x 35 ft. ice cream factory on South Main St. to Arthur C. Ayer, 23 Tanner St., Manchester. $10,000.

Ice Cream Plant—Walkerside Dairy Co., W. R. Knowles, Mgr., Monmouth Road, Walkerville, Ont., preparing plans for construction of a new ice cream plant. Estimated cost $150,000.

Milk Plant—Pevely Dairy Co., Grand Blvd. and Chouteau Ave., St. Louis, Mo., having preliminary plans prepared for a milk plant at Cabool. Estimated cost $60,000.

Warehouse — M. Augenblick & Bro., subsidiary of Borden Co., 5 Bank St., Paterson, N. J., plan construction of a warehouse on East 25th St. Estimated cost $150,000. Architect not selected.

Cold Storage Plant—Oswego Independent Ice Corp., Oswego, N. Y., plans construction of an 80 x 100 ft. cold storage plant. Equipment will be required.

Ice Plant—Morehouse Ice Co. Inc., 1000 Ouachita National Bank Bldg., Monroe, La., will soon receive bids for construction of a 1 and 2 story ice plant.

Ice Plant—Owner, c/o W. C. Kirkpatrick, 124 West Fourth St., Los Angeles, Calif., preparing preliminary plans for construction of a dry ice plant at Hanford.

Ice Plant—H. C. Badger and Alex Davidson, c/o Herring Hotel, Amarillo, Tex., awarded contract for a 1 story, 70 x 145 ft. ice plant at 100 Garfield St. to Albert Randall, Amarillo. Estimated cost $50,000.

Ice Plant—Folly Brook Ice Co., Leland T. Wood, 51 Bissell St., South Manchester, Conn., having plans prepared for construction of a 1 story, 62 x 125 ft. ice plant at Bissell St. and Johnson Terrace. Estimated cost $75,000. Private plans.

Ice Plant—Mongiello Bros., 625 Communipaw Ave., Jersey City, N. J., having revised preliminary plans prepared for construction of a 1 story ice plant. Estimated cost $50,000. Christian Ziegler, 26 Journal Sq., Jersey City, is architect.

Ice Plant Addition—Artificial Ice Co., 3715 Easton Ave., St. Louis, Mo., awarded contract for a 2 story addition to ice plant, to A. H. Stiel, 813 Chestnut St., St. Louis.

Ice Manufacturing Plant—Charles Gabriel, 661 East Street, San Bernardino, Calif., awarded contract for construction of a 1 story, 50 x 107 ft. ice manufacturing plant at 38th St. and El Caion Ave., San Diego, to Olmstead Building Co., 2255 5th Ave., San Diego. Estimated cost $40,000.

Ice Manufacturing Plant — J. L. Laino, Fresno, Calif., plans construction of a 1 story, 40 x 219 ft. ice manufacturing plant on 9th St. Estimated cost $27,000 exclusive of equipment.

Ice Manufacturing Plant—Lutz Ice Co., O. Lutz, Pres., 109 North Moorison, Appleton, Wis., plans construction of a 2 story 85 x 150 ft. ice manufacturing plant. Estimated cost, including equipment $40,000. Architect not selected.

Ice Manufacturing Plant—Save Service Station Inc., 852 Jamaica Ave., Jamaica, N. Y., plans construction of a 1 story, 73 x 148 ft. ice manufacturing plant at Platewood Ave. and Long Island R.R. tracks. Estimated cost $45,000. Private plans.

Pre-Cooling Plant—Union Ice Co., Claremont, Calif., awarded contract for construction of a pre-cooling plant, eight car capacity to Gay Engineering Corp., 2650 Santa Fe Ave., Los Angeles.

Fruit Warehouse—Frank Fruit Co., Madison, Wis., awarded contract for construction of a 2 story, 78 x 100 x 50 ft. fruit warehouse to J. H. Findorff & Son, 601 West Wilson St., Madison.

Food Container Manufacturing Plant—Metal Package Corp., 110 East 42nd St., New York, N. Y., acquired a plant building at Chicago, Ill., and plans alterations for the manufacture of cans and food containers. Estimated cost $150,000. Work will be done by day labor and separate contracts.

Fish Warehouse and Refrigeration Plant—Gloucester Fish Pier Corp., J. A. Dahlmer, Gloucester, Mass., having preliminary surveys made for construction of warehouse and refrigeration plant at Gloucester Fish Pier. Estimated cost $50,000. Fay, Spofford & Thorndike, 44 School St., Boston, are engineers.

Malt Factory—Vancouver Malt & Sake Brewing Co. Ltd., 2235 Triumph St., Vancouver, B. C., awarded contract for construction of a new malt factory including warehouse, fermenting room, bottling and shipping room, storage room, mash room and boiler room at 1445 Powell St.

Grain Elevator — Orville Stout, Vincennes, Ind., will build a corn mill and grain elevator at 506 Broadway. Estimated cost $50,000. Bacon & Tislow, 1015 Architects Bldg., Indianapolis, are architects. Work will be done by separate contracts.

Rice Mill—Canada Rice Mills Ltd., 343 Railway St., Vancouver, B. C., awarded contract for construction of rice mill, warehouse, wharf and storage building on Fraser River, to Morgan & McKee, 119 West Pender St., Vancouver. Estimated total cost $100,000.

Laboratory Building—Connecticut Agricultural Experimental Station, W. L. Slate, Huntington Road, New Haven, Conn., awarded contract for construction of a laboratory building to Allyn Wadhams Co., 15 Lewis St., Hartford, $62,976.

Pre-Cooling Plant—Upland Citrus Association, Upland, Calif., preparing plans for construction of a pre-cooling plant. Estimated cost $65,000. W. W. Ache, 1616 Fourth St., Los Angeles, is architect.

Citrus By-Products Laboratory — Dept. of Agriculture, Washington, D. C., receiving bids for a citrus by-products laboratory at Texas Experiment Station between Mercedes and Weslaco, Tex. Private plans. Equipment will be required.

Packing Plant (Lemon)—Limoneria Co., 117 North 10th St., Santa Paula, Calif., awarded contract for a lemon packing plant to Johnson & Hansen, 64 North First St., Ventura, $40,857.

Packing Plant—Atlantic Commission Co., c/o L. C. Baum, Div. Mgr., Harlingen, Tex., will soon award contract for construction of a 2 story packing plant and office building. Private plans.

Packing Plant—Engineering Dept., Union Pacific System, Pacific Electric Bldg., Los Angeles, Calif., is receiving bids for construction of a 1 story, 80 x 150 ft. packing plant at Fourth and Vine Sts., Riverside. Estimated cost $50,000.

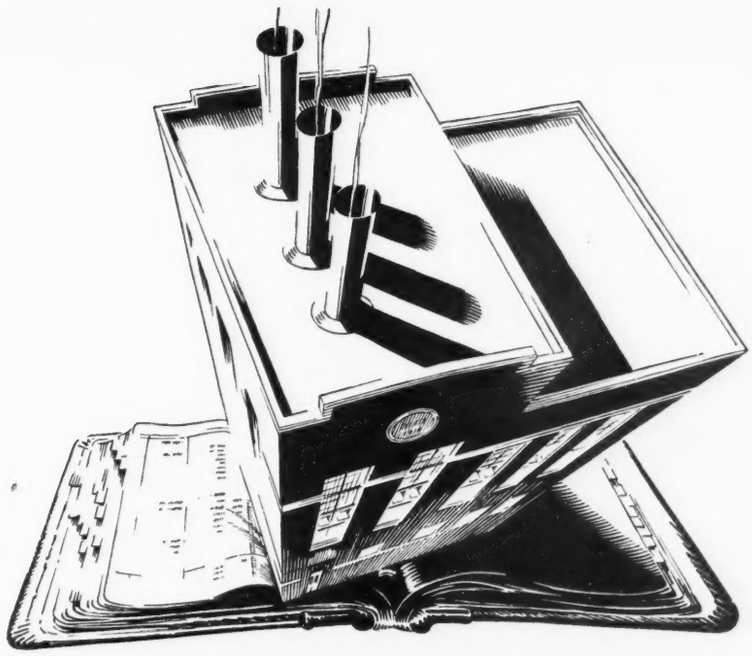
Packing Plant — Iowa Packing Co., Maury and East 8th Sts., Des Moines, Ia., awarded contract for stock pens to Garmer & Stiles Co., 519 Fourteenth St., Des Moines. Estimated cost $35,000.

Packing Plant Addition—Rath Packing Co., Elm and Sycamore Sts., Waterloo, Ia., awarded contract for a 4 story, 60 x 132 ft. addition to packing plant to H. A. Maine Construction Co., 305 Marsh-Place Bldg., Waterloo. Estimated cost $100,000.

Packing Plant—Frank Wolk Inc., 757 Crown St., Brooklyn, N. Y., will soon award contract for a 2 story, 22 x 100 ft. packing plant at Johnson Ave. and White St. Estimated cost $30,000 including equipment. Stadler Engineering Co., 140 Liberty St., New York, is engineer.

Packing Plant (Meat)—N. J. Batteate, Hayward, Calif., receiving bids for a 1 story, 50 x 110 ft. meat packing plant. J. M. Smith, 251 Kearny St., San Francisco, is engineer.

Packing Plant (Meat)—Swift & Co., 51 South Commerce St., Mobile, Ala., preparing plans for construction of a 2 story meat packing plant to Congress and Magnolia Sts. Estimated cost $100,000.



A NEW SLANT ON POWER!

about losses that "blush unseen" in the balance sheet

? How about *your* steam plant? Always have plenty of power? Probably you've never had to shut down because the steam plant failed. And that may be the reason why you have never had your power facilities thoroughly "dollar" diagnosed.

¢ The cost of steam or power used in the manufacture of your product may be a fraction of a cent . . . insignificant. Often in reducing the cost of a single product it doesn't count, yet at the end of a year's operation, power losses that "blush unseen" in the balance sheet aggregate thousands of dollars . . . in the red instead of in the profit column.

% It's safe to say that you haven't overlooked many opportunities to cut the cost of your product . . . yet power—a definite part of your overhead—has not contributed its share to profits.

$ In such cases the value of the outside viewpoint cannot be over-estimated. Why not investigate the "dollars and cents" value of a Steam Plant Survey and Report by Austin Engineers? Their analytical engineering experience has proven very helpful in exposing hidden losses. This service will show you the degree of efficiency of your present facilities. It will tell you what savings can be effected and how. It also will answer the question . . . to buy or not to buy your power.

!! And whether your present plant can be modernized or a complete new layout is necessary, Austin is organized to carry on through the entire operation, from preliminary report to steam in the boilers!!

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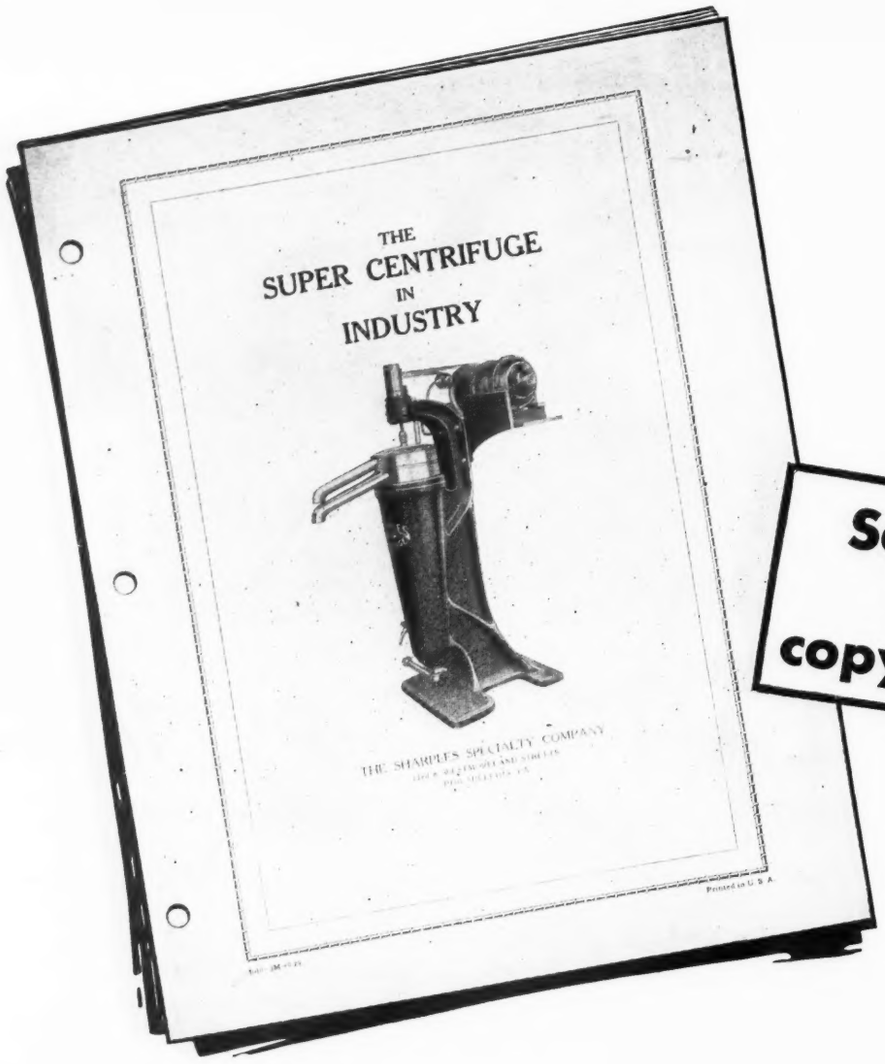

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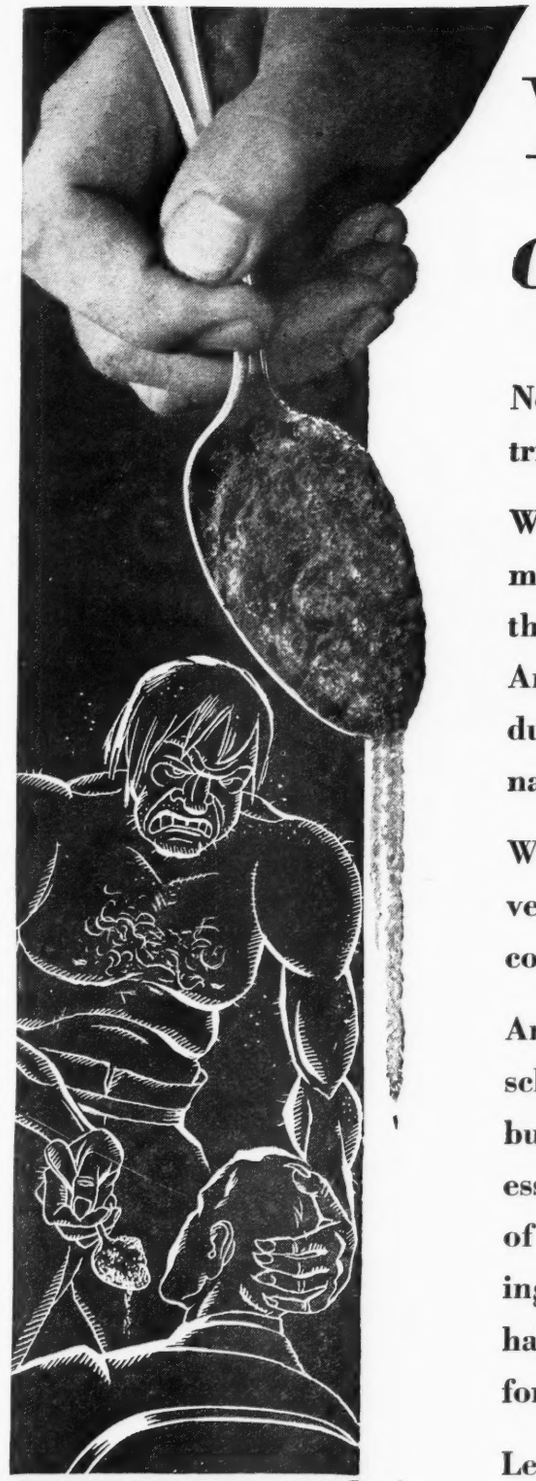

AMERICAN AIR FILTERS

Your Daily Dose of DIRT

Nowhere is pure, clean air so important in industries as in the manufacture of food products.

Where foods are made and packed the products must be protected from bacteria and mold spores that destroy both purity and keeping qualities. American Air Filters are being used in the food industries to provide pure, filtered air and thus eliminate the danger of spoilage.

Where foods are served, American Air Filters prevent air contamination in the kitchens, increase the comfort of the guests and reduce redecorating costs.

American Air Filters of various types are in use in schools, hospitals, hotels, department stores, public buildings, factories—wherever pure, clean air is essential. They are driving back the last frontier of bacteria. They are saving property and increasing the efficiency of employees. They are calling a halt to the high tax that industry has been paying for its daily dose of dirt.

Let us send you literature giving facts and figures on the savings that American Air Filters are effecting for food and drug manufacturers, restaurants, hotels and cafeterias—or how they can save money for *you*.

American Air Filter Co., *Inc.*

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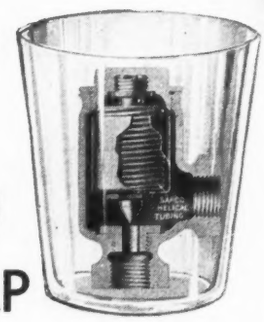
DON'T BE FOOLED BY SIZE

Big traps cannot handle more condensation than the small



SARCO STEAM TRAP

Although the Sarco is so small that it will go inside of a tumbler, it handles as much condensation as big, clumsy traps. Letter recently received from B. H. Rea Kenton, O., states that the Sarco is "holding its own against more expensive traps."

No trap can discharge condensation faster than it will pass through the valve orifice.

The large orifice in a Sarco Trap enables it to handle condensate as fast as it forms. It returns condensation to the hot well while still hot, so you do not need so much coal to turn it back into steam. Because of its small size, the Sarco can be screwed into the pipe line.

It costs about one-third the price of big traps, consequently individual units can be trapped inexpensively. That eliminates trapped air and radiation from long pipe lines, resulting in reduced fuel consumption.

FREE TRIAL

Let us send you a Sarco on 30 days' free trial. If not more than satisfied, return it and the trial won't cost you a cent.

Mail the coupon for further information.

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☐ Send copy of your Catalog AE-95.
☐ Send a Sarco Steam Trap on 30 days' trial, size.....for pressure .....lbs.

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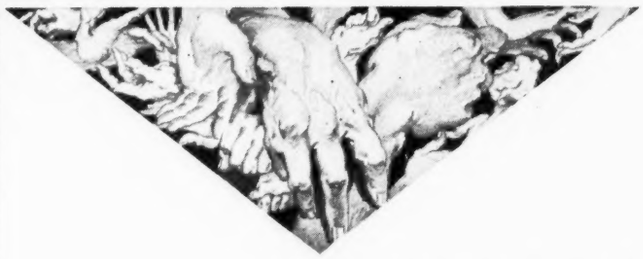
HANDS



Untouched by Human Hands...

is a Money Saving Proposition.

"Untouched by hands" has proved to be vital economy—a necessary sanitary measure in the preparation of food products.

Every touch by human hands—every manual contact—means greater opportunity for contamination and increases the final cost of the product.

Jeffrey Mechanical Handling Systems—belt, apron, bucket, scraper conveyors—bucket elevators, etc.,—are widely used in food product plants.

The illustrations below show Jeffrey Conveyors handling a variety of food products.

Jeffrey Engineers have had ample experience in combining various types of units for maximum economy. They are particularly skilled in methods of preventing contamination.

By taking advantage of this Jeffrey Engineering Service you can make sure that your plant has the most efficient material handling system for the job.

Write us today.

The Jeffrey Manufacturing Company

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Buffalo	Scranton, Pa.	Chicago	Houston
Rochester, N. Y.	Cincinnati	Huntington, W. Va.	Salt Lake City
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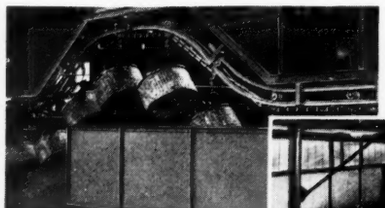
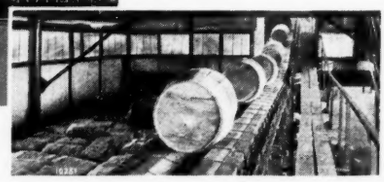
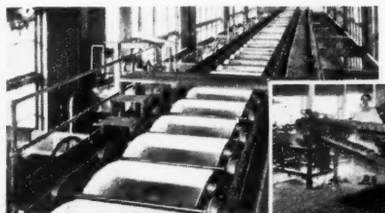
Jeffrey Manufacturing Co., Ltd., of Canada,
Head Office and Works: Montreal—Branch Office: Toronto



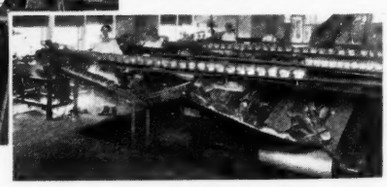
A Jeffrey Trolley Conveyor (left) handling canned goods through cooling tanks.



A Jeffrey Troughed Flight Apron Conveyor (right) handling sugar barrels.

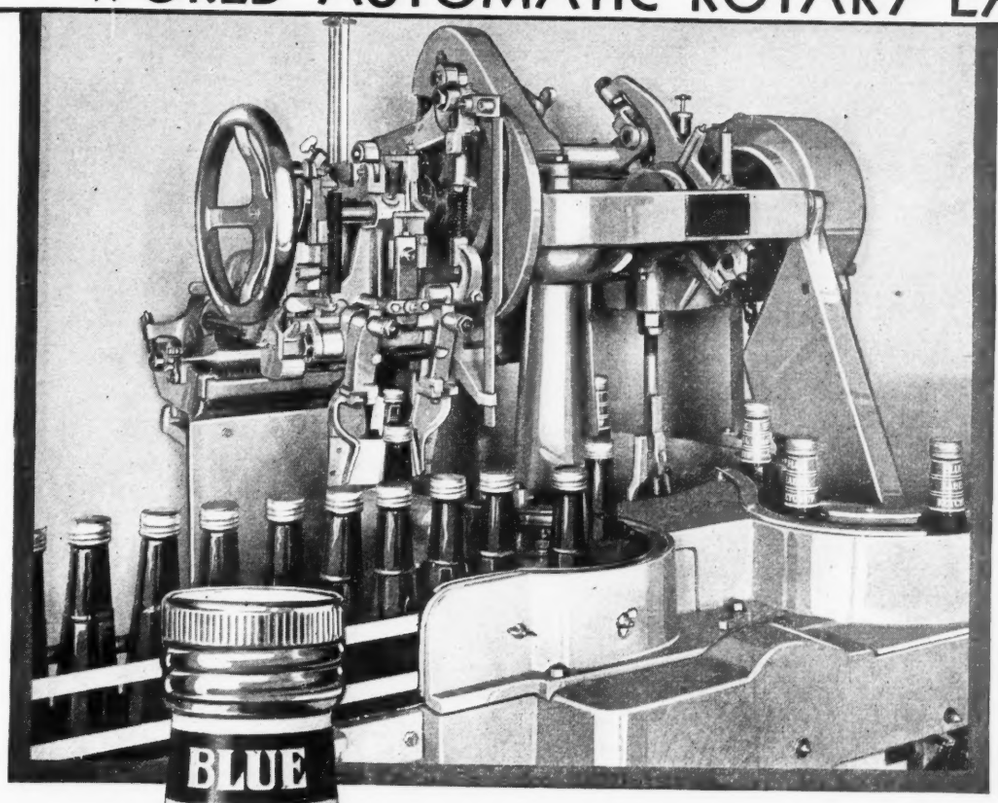


A Jeffrey Belt Conveyor installation (below) handling bread in a modern bakery.



A Jeffrey Pivoted Bucket Conveyor (above) for handling liquid or loose material such as soup, sugar, etc. Furnished with enameled buckets.

WORLD AUTOMATIC ROTARY LABELER



Another striking example of the diversification of World Labelers.

Blue Label Ketchup is being labeled successfully by this remarkable machine, the label surrounding the recessed neck of the bottle.

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Largest Manufacturers of Labeling Machines in the World

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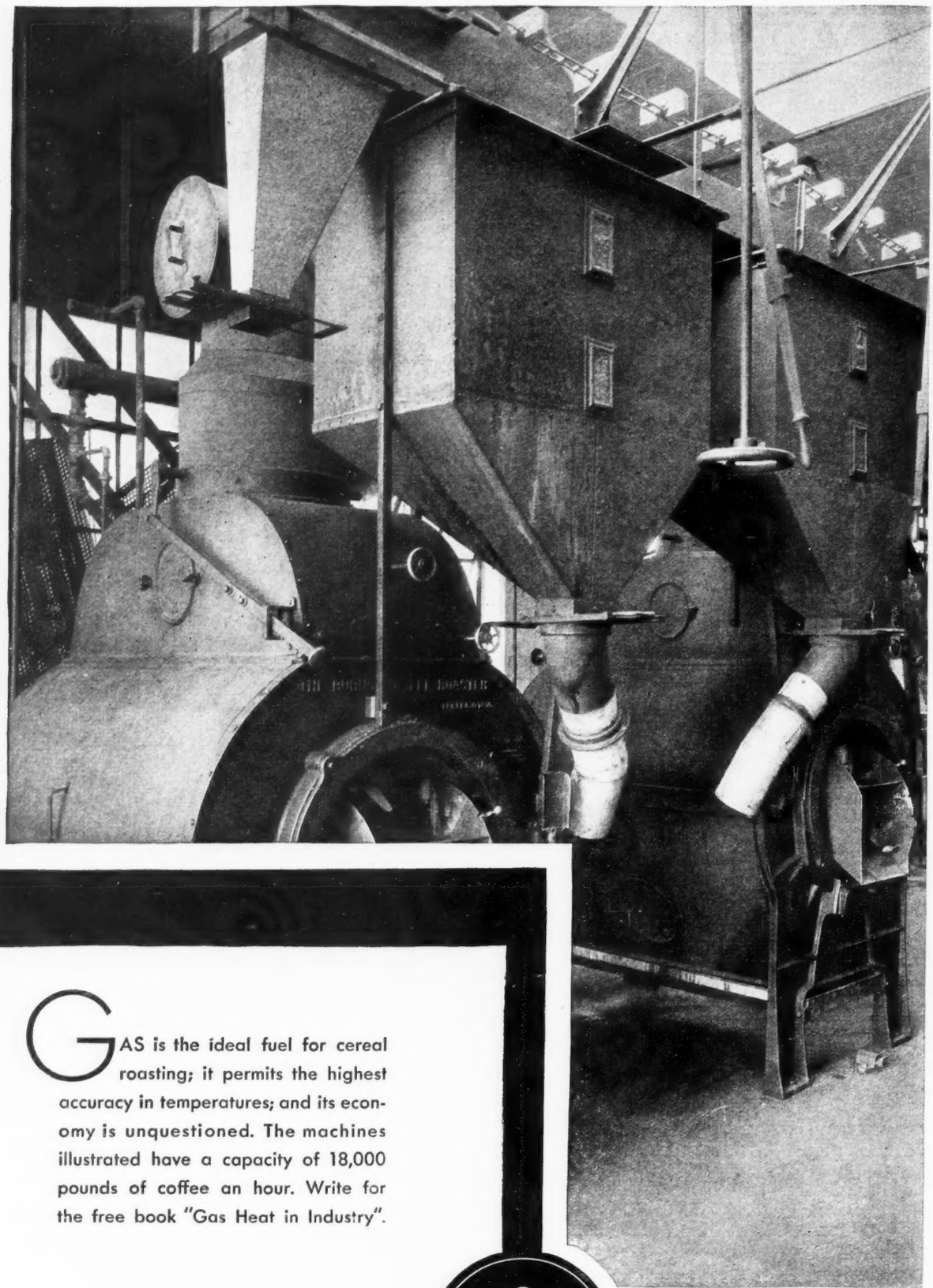

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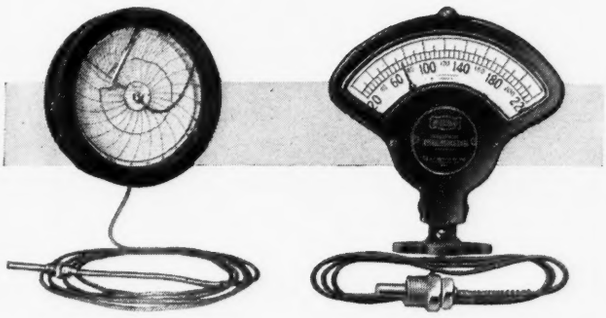

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Standard Type Industrial Thermometer

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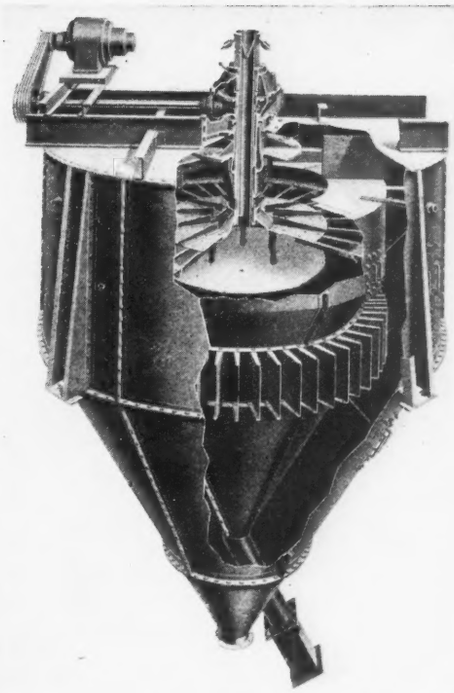

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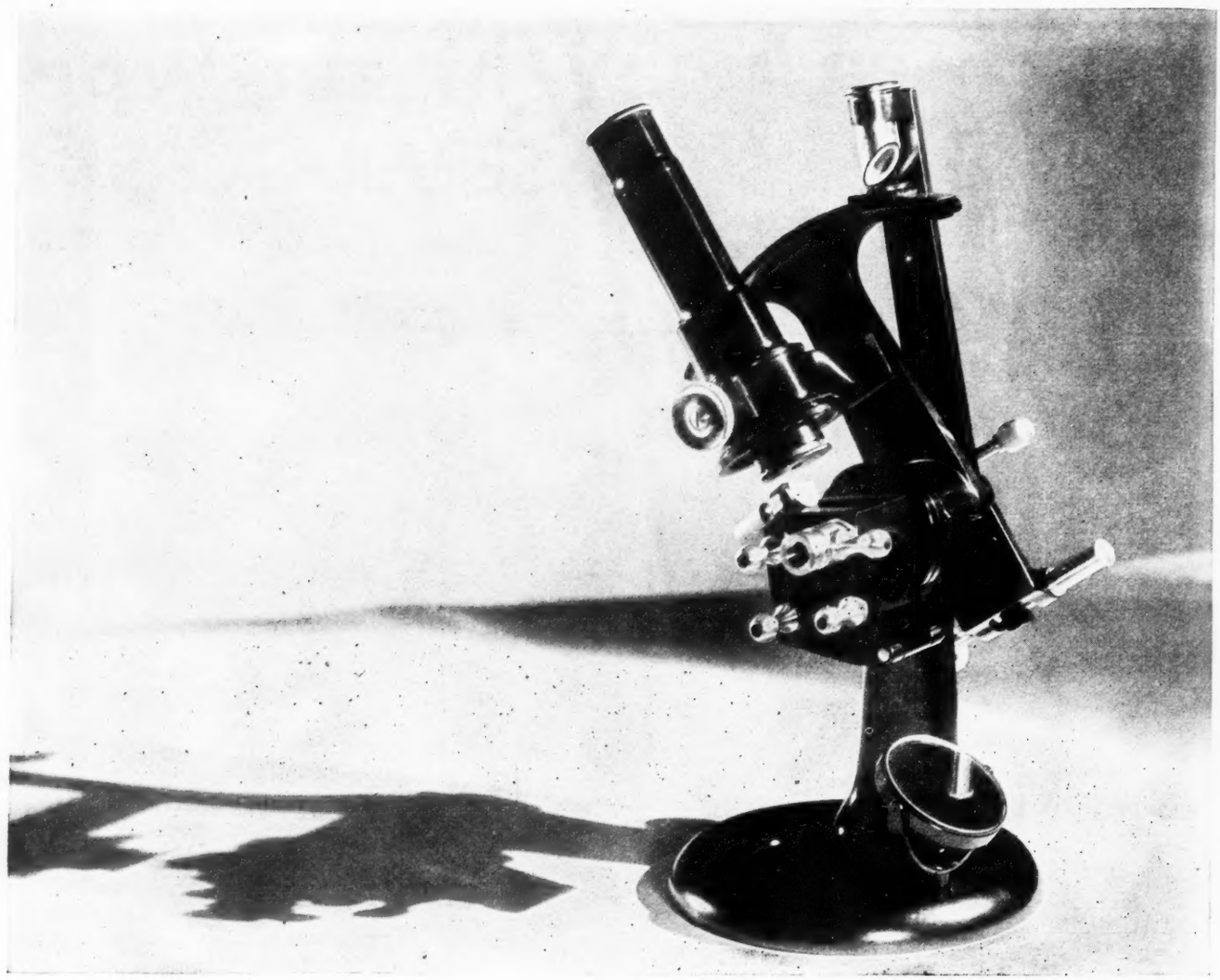

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TOO much is wasteful, too little hurts quality, but just right means a proper product, well and economically made.

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In determining and controlling the concentration of syrups, the strength of alcohol in flavoring extracts, for the identification of essential oils used in flavoring and for the identification of shortening materials the B & L Abbe Refractometer gives positive results, quickly and accurately. Only a few drops of the substance are necessary for reading.

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MOISTURE-PROOF SYLPHRAP, self-sealed with moderate heat, offers an invaluable means of wrapping food products right and sealing them tight. For by test and in actual practice, this moisture-proof transparent cellulose paper, eliminates the use of objectionable adhesives and undesirable solvents. Or adhesives may be used if desired.

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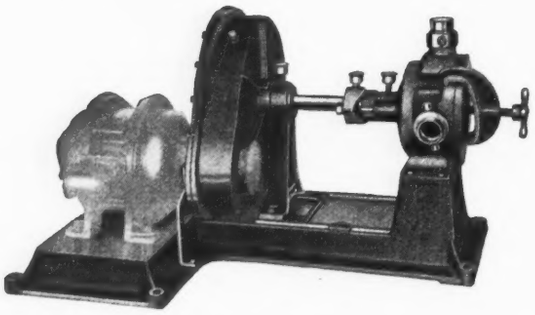

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But equally important in these days when every expenditure is being closely checked . . . the Viking is extremely attractive in price. In fact . . . quality and workmanship considered . . . it is the lowest priced sanitary pump on the market. You get so much for so little when you invest in Viking Sanitary Rotary Pumps. Write today for FREE Catalog and Special Food Plant Bulletin VS-100-31.

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Washington authorities have stated that the annual loss in Foodstuffs due to insect pests reaches close to $300,000,000.

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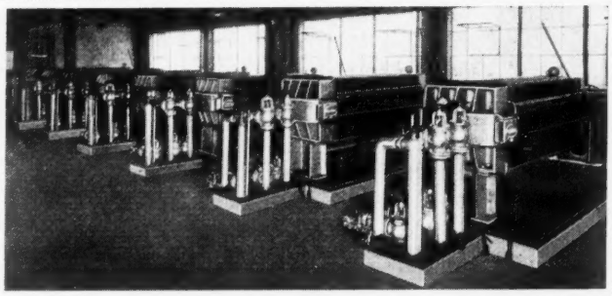

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Crisco, the right cooking arm of the housewives, the chefs and the cooks of the world, is another famous food product, filtered during processing with Shriver Filter Presses. Many prominent food firms are using Shriver Filter Presses to their profit.

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Filter Presses Filter Cloth Diaphragm Pumps

U S S Chromium-Nickel Alloy Steels produced under licenses of the Chemical Foundation, Inc., New York; and of Fried. Krupp A. G. of Germany.

THESE products are particularly adapted for modern uses. Thorough metallurgical research preceded the commercial production of U S S Chromium and Chromium-Nickel Steels. The performance not of one alloy but of many, was observed and studied under various conditions so that the best combination of properties might be obtained. No one composition was found equally suitable for all requirements, but a series of alloy steels each calculated to give maximum satisfaction and economy within a certain range of use, was the outcome.

U S S Stainless and Heat Resisting Steels are offered by American Sheet and Tin Plate Company, in SHEETS and LIGHT PLATES, as an answer to the technical demands of the industries. Correspondence is invited and advice will be given gladly according to the particular purpose of each inquirer.

This Company manufactures high grade sheet and tin mill products for all known uses. Write for full information on AMERICAN Black and Galvanized Sheets, Special Sheets, Tin and Terne Plates; and KEYSTONE Rust Resisting Copper Steel products.

American Sheet and Tin Plate Company

GENERAL OFFICES: Frick Building, PITTSBURGH, PA.

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES:

AMERICAN BRIDGE COMPANY
AMERICAN SHEET AND TIN PLATE COMPANY
AMERICAN STEEL AND WIRE COMPANY
CARNEGIE STEEL COMPANY
COLUMBIA STEEL COMPANY
CYCLONE FENCE COMPANY
FEDERAL SHIPB'LDG. & DRY DOCK CO.
ILLINOIS STEEL COMPANY
MINNESOTA STEEL COMPANY
NATIONAL TUBE COMPANY
OIL WELL SUPPLY COMPANY
THE LORAIN STEEL COMPANY
TENNESSEE COAL, IRON & RAILROAD CO.
UNIVERSAL ATLAS CEMENT COMPANY

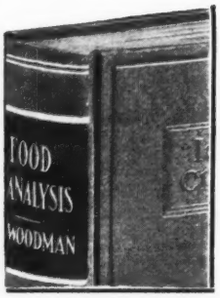
Pacific Coast Distributors—Columbia Steel Company, Russ Building, San Francisco, Calif.
Export Distributors—United States Steel Products Company, 30 Church Street, New York, N. Y.

Your name stamped on this book FREE

At no additional cost to you, we will stamp your name, or a friend's name, in gold, on the front cover of any copy of Woodman's Food Analysis ordered from this advertisement. This is a special Christmas offer, limited to acceptance before January 1, 1932.

Third Edition—
completely revised

Food Analysis



Typical Methods and the Interpretation of Results

By A. G. WOODMAN

Associate Professor of Chemistry of Foods, Massachusetts Institute of Technology

557 pages, 5½ x 8, 110 illustrations, $3.50

IN THIS book the author has selected a variety of food materials calculated to illustrate the important methods of attack and the characteristic methods of analysis. Three classes of foods —fats and oils, carbohydrate foods and alcoholic beverages—have been treated at some length; general methods, common to the group, being taken up first in each case, followed by a more detailed discussion of several typical examples. The detection and identification of artificial colors has been treated fully.

In this third edition all data have been brought thoroughly up-to-date. Some of the methods have been changed to conform to the advances initiated by the referees of the Association of Official Agricultural Chemists.

Special emphasis is given to the importance of the interpretation drawn from the results of analysis.

Chapter Headings

1. General Methods. 2. The Microscopical Examination of Foods. 3. Food Colors and Preservatives. Chemical Preservatives. 4. Milk and Cream. 5. Edible Fats and Oils. Olive Oil. Butter. 6. Carbonydrate Foods. Maple Sirup. Honey. 7. Cocoa and Chocolate. 8. Spices. Pepper. Cassia and Cinnamon. Cloves. Mustard. 9. Cider Vinegar. 10. Flavoring Extracts: Extract of Vanilla. Lemon Extract. Extract of Ginger. 11. Alcoholic Foods. Wine. Whiskey.

Send your free stamping order today

Do you want to make a friend a gift combining personal thoughtfulness with real utility? Do you want a copy of **Woodman's Food Analysis** that you will doubly prize? Then take advantage of this free stamping offer. Send the coupon today. (Proper remittance should be enclosed with orders and, of course, stamped copies are not returnable.)

SPECIAL HOLIDAY OFFER COUPON

McGraw-Hill Book Company, Inc., 330 West 42d Street, New York.
Send me **Woodman's Food Analysis** with name stamped in gold on the front cover. I enclose $3.50 and understand that stamped books are not returnable. (This offer expires Jan. 1, 1932.)

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(Name to be stamped. Please print)

Name .....

Address .....

City and State ..... Food. 12-31

Cleaning that helps you sell

SPARKLINGLY clean, displaying its label to best advantage, every jar and can cleaned the Oakite way is a spic and span salesman for your product.

And Oakite cleaning helps increase profits in other ways. By removing every trace of burnt-on food from kettles and retorts; by keeping vats, tanks and other equipment spotless and sanitary, it protects the purity and quality that build your reputation. The speedy, effortless cleaning provided by Oakite materials keeps costs at a minimum.

Our nearby Service Man can offer suggestions that will help you handle your particular cleaning problems more easily and at less cost. Write us to have him call.

Manufactured only by
OAKITE PRODUCTS, INC., 26G Thames St., NEW YORK, N. Y.

OAKITE
TRADE MARK REG. U.S. PAT. OFF.
Industrial Cleaning Materials and Methods

TAGLIABUE N.Y.
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RECORDERS
DIAL-INDICATING THERMOMETERS
CONTROLLERS
OIL-TESTING INSTRUMENTS
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Offers . . . . . .
. . . every type of precision instrument for Automatic Cannery Control . . . here they are:
TAG Temperature, Pressure & Time Controllers
TAG Temperature & Pressure Recorders
TAG Dial - Indicating Thermometers
TAG Canning Thermometers
TAG Laboratory Thermometers & Hydrometers
Now's the time for thermometer repairs so that you'll be ready for the 1932 pack. No matter what the make TAG will do the job and give you a guarantee of accuracy.
You'll find the complete line of TAG Cannery Control Instruments on display at Booth 55, Stevens Hotel, Chicago, Jan. 25th to 29th If you can't see them in person, send for Catalog 440-2. It describes them all.
C. J. TAGLIABUE MFG. CO.
PARK AND NOSTRAND AVES., BROOKLYN, N. Y.
Instruments for Indicating, Recording and Controlling
TAG
BRANCH FACTORIES
CLEVELAND, OHIO SAN FRANCISCO, CALIF. SHREVEPORT, LA.

That's Dollars And "Sense" Talk

HACKNEY permanent steel barrels have long been famous for their seamless, leak-proof construction; their patented raised openings, which drain the contents to the last drop—or full removable heads, which make emptying and cleaning so easy; their ability to take hard knocks without denting — attractive appearance—and easy handling.

Those are advantages for which many companies would gladly pay a premium. But instead — Hackneys frequently save them more than 40% in their shipping costs.

Permanent containers, however, are not always the most economical. And Hackney sells thousands of dollars worth of single trip containers every year. *But the possible savings in using Hackney returnable steel barrels and drums are too great to pass up without an investigation.* Let us work with you in analyzing your shipping problems to see if permanent containers cannot lower your shipping costs.

A Few Prominent Hackney Users

Grasselli Chemical • Pittsburgh Plate Glass • Procter & Gamble • C. & N. W. R. R. • Delco Light Co. • Southern Cotton Oil • White Eagle Oil Refg. Co. Paper Makers Chemical • Du Pont

PRESSED STEEL TANK COMPANY

1173 Continental Bank Bldg. . . . . Chicago
1349 Vanderbilt Concourse Bldg. . New York City
5771 Greenfield Avenue . . . Milwaukee, Wis.
477 Roosevelt Building . . . Los Angeles

Hackney
MILWAUKEE

"Peak load" now

- - - but still You can have Dependable Process Steam - with a KANE Boiler!

Two 10 hp. Kane Boilers — heating steam jacketed kettles and steam tables in the kitchen of James Brothers, makers of salt water taffy, Atlantic City, N. J.

Heating and power boilers carry such a peak load now that there is little steam left to by-pass for processing. And what there is can rarely be depended upon for fixed temperature, pressure, or degree of saturation—

An independent automatic gas-fired steam generator is not only year around *economy,* but *now* it is virtually the only way to get dependable steam for food processes.

The KANE gas-fired automatic boiler gives you clean steam when you need it, without labor of firing, fuel or ash problems, long pipe lines, reducing valves, etc.

A KANE installation makes your processing absolutely independent, automatic, consistent, and economical. And you can exactly match any process with the boiler capacity you require—17 sizes of the KANE to choose from. *Get in touch with us now!*

KANE Boilers

Send for Bulletins

MEARS-KANE-OFELDT INC.

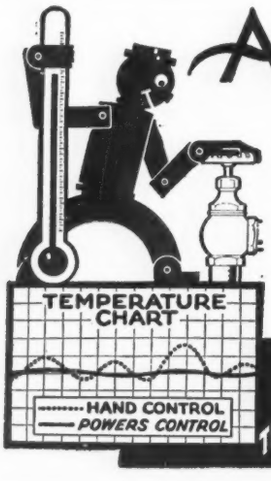
Executive Offices and Factory

1903-1915 EAST HAGERT ST. PHILADELPHIA

BRANCH OFFICES OR DISTRIBUTORS IN PRINCIPAL CITIES

Makers of Automatic Gas Boilers for over a Quarter Century

• WRITE TODAY • **A number of foresighted manufacturers are spending money in these pages to tell you about their products and service. These men are justifying their belief in industrial America's future and their faith in advertising. Pull along with them by finding out what they can do to help you. Advertised products are dependable products.**



Automatic Temperature Control

TO ERR IS HUMAN—eliminate the errors of hand control of temperature with the mechanical accuracy of a Powers Regulator. It will quickly pay for itself by speeding up production—helps you to get a still better and more uniform product, and stops steam losses due to overheating. Let our engineers study your problems of temperature control and recommend the type of regulator that will give the best results at the lowest cost.

CHICAGO—2755 Greenview Ave. NEW YORK—231 E. 46th St.

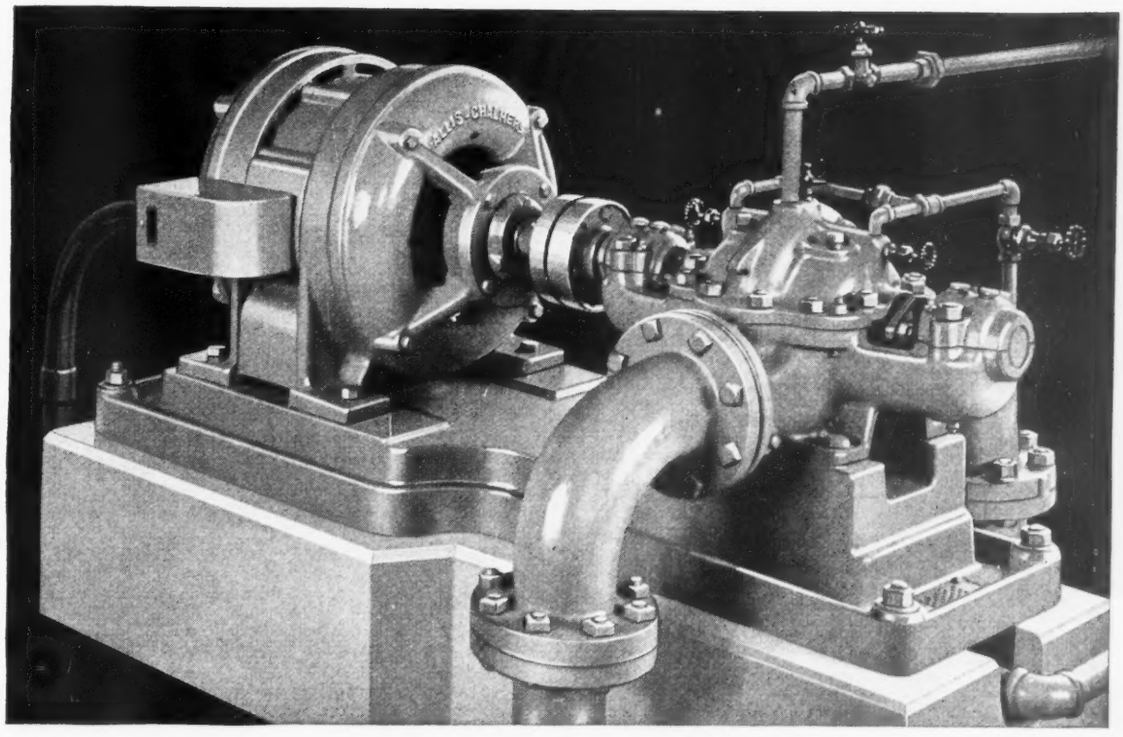
THE POWERS REGULATOR CO.

OFFICES IN 40 CITIES

40 YEARS OF SPECIALIZATION IN HEAT CONTROL

Good Appearance!

an Allis-Chalmers Mark of Quality Performance



Centrifugal Pumps

The Allis-Chalmers line consists of low, moderate, and high head single stage pumps of 1″ to 72″ discharge, multi-stage pumps for working pressure up to 1500 pounds, high efficiency paper stock pumps, and pumps for special applications.

ALLIS-CHALMERS Centrifugal Pumping Units have a fine substantial appearance and it is a reasonable assumption that they will perform as well as they look. When fine appearance and substantial construction are backed up by nearly fifty years experience building Centrifugal Pumps, purchasers can have confidence in these pumps for their requirements. A trial, however, will be the best proof.

ALLIS-CHALMERS

Allis-Chalmers Manufacturing Company, Milwaukee

many a production profit

The editors offer you this sample

Subjects now scheduled for the Distribution Issue include:

1. *How Far Has Distribution Solved the Manufacturer's Problems?*
2. *Adapting The Wholesaler to the New Order.*
3. *What the Chain Store Does for The Manufacturer.*
4. *Pros and Cons of Price Maintenance.*
5. *The Problem of Store Door Delivery.*
6. *Frozen Food Distribution.*
7. *Avoiding Waste in the Distribution of Products (seven articles on as many food products)*

The above—and more—plus 1931 statistics—plus the regular news and patents sections—all at no increased price to either reader or advertiser.

IN a word this explains why Food Industries, a publication edited for production executives and technicians, will devote an entire issue to the subject of distribution. Perhaps in no other industry is distribution exposed to so many hazards as it is in the industry that makes the food we eat. Spoilage resulting from delays in transit, or through slow turnover, is only one illustration of why the food manufacturer must plan his distribution on the production line.

In the course of a year Food Industries presents a happy balance of editorial data and information on production, processing and distribution. Sensing the increased attention that food men are giving to distribution problems, its editors have explored the experience of manufacturers

The Distribution Issue of F

becomes a distribution loss

with extra diligence. What they have found of common interest to the industry will be concentrated in the January issue of Food Industries, along with the industry's 1931 statistics.

If you found last January's statistical issue valuable as a reference publication throughout the year, you can appreciate how much more valuable this Distribution Issue will be. Now is a good time to check up the subscriptions among your key men. If additional copies will be required let us know at once so there will be no disappointments after the issue is off the press.

FOOD INDUSTRIES

McGraw-Hill Publishing Company, Inc.

330 WEST 42ND STREET NEW YORK, N. Y.

Important to Advertisers

If your product is related in any way to safe-guarding foodstuffs in transit or storage; if it can reduce transportation rates on food products; if it can safely increase the keeping qualities of food products; if it can simplify handling methods in the plant and from the plant to distributor and consumer — then here is an editorial theme for your advertising to capitalize in January.

All advertisers in this issue are assured the increased reader interest and the long pull characteristic of a reference medium of this type.

Color forms close December 10; black forms, December 19.

# of FOOD INDUSTRIES · January

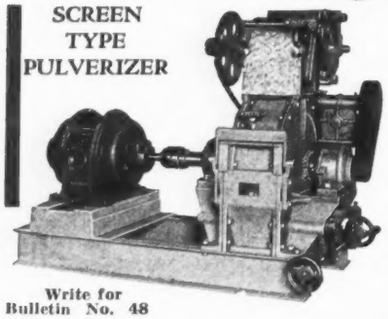
MODERNIZE

Your Grinding, Sifting and Mixing Departments With

UNIQUE

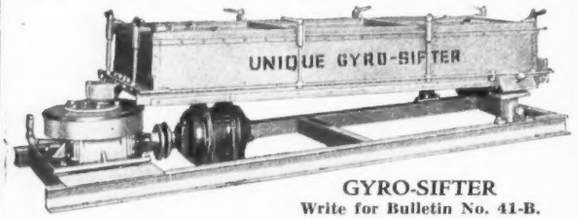
Food Processing Equipment

SCREEN TYPE PULVERIZER



Write for Bulletin No. 48

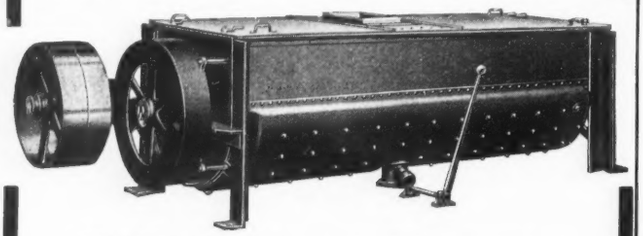
This is a powerful, compact Pulverizer of advanced design for uniformly reducing, to any degree of fineness, such materials as sugar, cocoa, salt, spices, malted milk, dried milk, colors, gums, etc. It is ideal for uniformly reducing and thoroughly blending a combination of products at one time. Requires no separators, fans, or collectors. Operation is entirely dustless.



GYRO-SIFTER
Write for Bulletin No. 41-B.

The Gyro-Sifter is noted for its wide flexibility in making distinct, accurate separations on all types of products —with the least maintenance and attention. It is used extensively for screening baking powder, beet pulp, coffee, cream tartar, dried milk, flour, gelatin, salt, spices, sugar, etc., and for removing lumps, nails, strings and other foreign substances from products that are received at the plant.

These quality Sifters may be combined with UNIQUE Grinders and Mixers to make an efficient, economical set-up to meet individual installation requirements.



UNIQUE MIXERS—Write for Bulletin No. 32-B.

We offer the most complete and most extensive line of mixers on the market—small laboratory models or mammoth large capacity machines—for definite operations on all kinds of powders, semi-solids and liquids. UNIQUE Mixers insure a rapid, thorough mix, operate with the minimum power consumption and require practically no attention.

Let UNIQUE Engineers show you a modern, time saving food processing set-up.

ROBINSON MFG CO.

71 PAINTER STREET — MUNCY, PA.

A Complete Line of Food Processing Equipment PLUS—A Helpful Engineering and Advisory Service

Ventilate

for better working conditions in winter

WHEN cold weather closes doors and windows, take care of ventilation with BREEZO fans. Keep air circulating and your heating bills will be lower, while the atmosphere in your plant will be more healthy.

BREEZO fans are made in sizes from 8 in. to 36 in. diameter. They have large capacities, and are quiet. Send for illustrated booklet 2321-D.

Buffalo Forge Company

181 Mortimer Street, Buffalo, New York

In Canada: Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

BUFFALO BREEZO

SEARCHLIGHT SECTION

EMPLOYMENT : BUSINESS : OPPORTUNITIES : EQUIPMENT—USED or SPECIAL

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 5 cents a word, minimum $1.00 an insertion, payable in advance.

Positions Vacant and all other classifications 10 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of our New York, Chicago or San Francisco offices count 10 words additional in undisplayed ads.

Discount of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH.

1 inch $5.00
2 to 3 inches..... 4.75 an inch
4 to 7 inches..... 4.50 an inch

Other spaces and contract rates on request.
An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page. Food Industries

COPY FOR NEW ADVERTISEMENTS RECEIVED UNTIL 3 P. M. ON THE 24TH FOR THE ISSUE OUT THE 2ND OF THE FOLLOWING MONTH

POSITION WANTED

FOOD ENGINEER—College graduate with 12 years' experience teaching food products manufacture and actual operation, maintenance, design, chemistry and bacteriology of food products plant, desires position with reliable manufacturer. Will furnish best of references. PW-99, Food Industries, 330 W. 42d St., New York.

BUSINESS OPPORTUNITIES

Improved Site

For one or more industrial concerns, approximately one mile square, in this vicinity; adapted to successful operation of every kind of manufacturing due to commercial, industrial and natural advantages it possesses; photograph and data forwarded upon request; 5 years free taxes. Ed. Lea Davis, Flatiron Bldg., Chattanooga, Tennessee.

Want 2,500 Square Feet

More later. Metropolitan New York. Suitable manufacturing foods, from owner who can assist financially. BO-98, Food Industries, 330 W. 42d St., New York.

Wanted

The distribution of an article or articles of merit for Kansas City and district. Responsible. Main Supply Co., 6139 Main St., Kansas City, Mo.

Institutional-Chain Store-Jobbing Trade
(Food Line)

Salesman with a valuable contact with chain grocers, wholesalers, hotels, institutions in Boston and New England seeks a connection. Twelve years' experience calling on this trade. Can furnish A-1 references. Would like to handle a new specialty or any food product of merit. Write,

JOSEPH A. DUFFLEY
36 Clyde St., Belmont, Mass.

WANT TO *SELL* A FOOD PRODUCT IN N.Y.C.?

If you are a food manufacturer and want to enter the New York Metropolitan Market or increase your present sales therein, we can operate for you effectively.

We are specialists in selling food products in New York City—doing one thing and doing it well. Wide and close association with retailers, jobbers and chains. Thorough knowledge of the market. A record of proven results. ***Personal*** producers, quick, cooperative and alert. Commission basis. References. Write BO-97 Food Industries, 330 West 42nd St., N. Y. C.

UNION Rebuilt Machinery

ATTRACTIVE PRICES · RELIABILITY · PROMPT DELIVERY

ALL MACHINES RELIABLY GUARANTEED FOR ONE YEAR

Complete Stock Food Process Machinery

Copper Steam Jacketed Kettles with and without Agitators, capacities 25 to 1000 gallons, tilting and draw offs.

Dough and Food Products Mixers, single and double arm, one barrel to ten barrel capacity.

Vacuum Pans, 50 to 500 gal.

Filter Presses, Tanks, Grinding Mills, Bottle Filling and Pasteurizing Machines, Rotary Steam Dryers, Refrigerating Machines, all sizes.

Union Confectionery Machinery Co., Inc.
318 Lafayette St., New York, N. Y.

REBUILT MACHINERY

Send for latest Bulletins listing largest stock of Food Products Machinery, Mixers, Fillers, Dryers, Grinders, Filter Presses, Kettles, Mills, Vacuum Pans, Tanks, Pumps, etc.

We buy your idle Machinery.

CONSOLIDATED PRODUCTS CO., INC.
13-17 Park Row, New York. BArclay 7-0600

Mary Reed Harton

Contacts merchandising problems on the Pacific Coast for eastern manufacturers. Works under supervision of your western representative or direct from your home office. Fifteen years' experience with nationally advertised brands.

Could you make a trip to the Coast for $600?

Write for full details of service.

P.O. Box No. 155, Palos Verdes Estates, Calif. (a suburb of Los Angeles).

Someone can use the equipment you no longer need. Advertise it in the "Searchlight Section."

G-4

Copper, Steam Jacket, Kettles

Used Kettles 20 to 300 gallon, also new ones.

THOS. BURKHARD, INC.
494-496 Flushing Ave., Brooklyn, N. Y.
Coppersmiths since 1836

FOR SALE

Copper Steam Jacketed Kettles, Dough and Food Product Mixers, Bottle Washing Machines, Copper and Glass Lined Tanks, Filters, Filter Presses, Mills, etc.

We also purchase food product equipment. What have you to offer?

Loeb Equipment Co.
618-620 W. Lake St., Chicago, Ill.

Agents and Representatives

can be secured through the

SEARCHLIGHT SECTION

Responsible Agents and Representatives consult the Searchlight Section for new lines to handle.

NEW AND REBUILT

Buffalo Nut and Food Chopper, motor drive.
Day Clipper Egg Beaters, belt drive.
Double Pan Rack Trucks on casters.
Dough Mixers, single and double arm.
Leonard Date Pitter, motor drive.
Motors, D.C., 230 volt, 15 to 35 hp.
Steam Jacketed Copper Kettles, 10 gal. to 350 gal. capacity, with and without agitators, guaranteed steam pressure.

SAVAGE BROS. CO.
Since 1855—Candy Machinery—Coppersmiths
2638 Gladys Ave., Chicago, Ill.

Special Offerings

in PFAUDLER steam-jacketed TANKS and KETTLES.

also Wood TANKS and CASKS, all kinds. BOTTLERS' MACHINERY, WASHERS and RINSERS, FILLING and CAPPING Machines, PASTEURIZERS and LABELERS, FILTERS and FILTER PRESSES, every size and style, ROTARY STEAM DRYERS.

Write for our large illustrated CATALOG and Price Lists.

UNIVERSAL COMPANY
3625 Superior St., Detroit, Mich.

PROFESSIONAL SERVICES

FRANK C. GEPHART, Ph.D.

Research and Consulting Chemist

SPECIALIST IN THE CHEMISTRY OF FOOD AND ITS INDUSTRIAL APPLICATIONS SINCE 1906

Products developed, standardized, evaluated. Special problems investigated.

Office and Laboratories
23 East 31st St., New York

T. B. WAGNER
52 Vanderbilt Ave., New York, N. Y.
Consulting Chemical Practice
Chemical and Industrial Engineering

SPECIALIZED SERVICE TO FOOD and MILLING INDUSTRIES:

Developing new products and markets.
Enhancing returns from by-products.

FOOD RESEARCH LABORATORIES, Inc.
Philip B. Hawk, Director

BIOCHEMISTS TO THE FOOD INDUSTRIES

Investigation, Consultation, and Control.
Specialists in
VITAMIN ASSAYS
Food and Medicinal Products Developed, Tested and Standardized.

114 E. 32nd St., New York
Member Ass'n of Consulting Chemists and Chemical Engineers

SW&C
A NATIONAL ORGANIZATION FOR CONSTRUCTIVE SERVICE

Scovell, Wellington and Company

ACCOUNTANTS and AUDITORS

MANAGEMENT ENGINEERS

10 EAST 40TH STREET, NEW YORK

CLEVELAND SYRACUSE SPRINGFIELD
KANSAS CITY SAN FRANCISCO
BOSTON PHILADELPHIA CHICAGO

Pease Laboratories, Inc.
39-41 West 38th St., New York City

Complete Service to Food Packers
Food Preparation, Packing and Processing

Heat Penetration Determinations
Nutritional, Chemical and Bacteriological Research

PHILIP O. GRAVELLE

PHOTOMICROGRAPHS FOR INDUSTRY

Technical and Scientific Photographs made through the microscope, for the comparison of materials.

GRAVELLE PHOTOMICROGRAPHS

For Research, Development, Control and Advertising.

114 Prospect St., South Orange, N. J.
Telephone South Orange 2-2791

Dr. HENRY ARNSTEIN
191 E. Roosevelt Boulevard
PHILADELPHIA, PA.

Specialists in the utilization of natural resources, the elimination of waste and the recovery of by-products. Complete chemical and food producing plants constructed and operated. Technical advisor to the governments of Argentina, Brazil, Colombia, Cuba, etc.

PACINI LABORATORIES
9 So. Clinton Street, Chicago, Ill.
A. J. Pacini, Director

Vitamin Assaying

Biochemical and Nutritional Investigations

Development, Standardization and Testing of Food and Medicinal Products

Pioneers in Industrial Photochemistry

Skinner & Sherman
Incorporated

Chemists and Bacteriologists

Analyses, Research, and Consultation on Foodstuffs and Manufacturing Processes.

246 Stuart Street
Boston, Mass.

Applied Sugar Laboratories, Inc.

Consultants on Food Manufacturing Problems and Service Work to Manufacturers' Customers

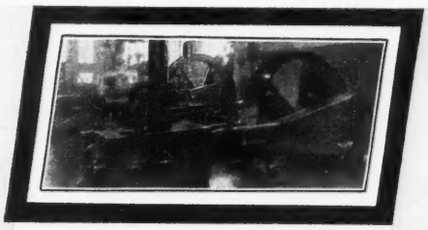
ANALYTICAL—PROCESS CONTROL—RESEARCH

111 WALL STREET *Telephone* DIGBY 4-5554 NEW YORK CITY

LLOYD A. HALL
Research and Consulting Chemist
Specializing in the Food Industries
Analyses—Research—Products Developed—Investigations
Consultation and expert Testimony.
1415 West 37th Street, Chicago, Ill.

FOOD PLANTS—
are generally dependent on the services of the professional consultant for the design of new plants, the perfecting or introducing of new processes, for research work, or for any chemical and scientific work that involves anything outside of ordinary plant routine.
Consult the men listed in the "Professional Service Section" of Food Industries when such problems arise.

FOODSTUFFS AND REFRIGERATION



The wide application of refrigeration to the food industries is axiomatic. In no other industry are so many processes contingent upon temperature control.

One of the Northwest's great wholesale grocers (Griggs-Cooper & Co., St. Paul, Minn.) has employed a Vilter system since 1925 with the usual efficient result.

Whether your problem be one of processing or storage, Vilter can serve you best! *Write* . . . and our engineering department will make prompt reply without obligation.

THE VILTER MFG. CO.
2115 So. 1st STREET
MILWAUKEE.....WISCONSIN

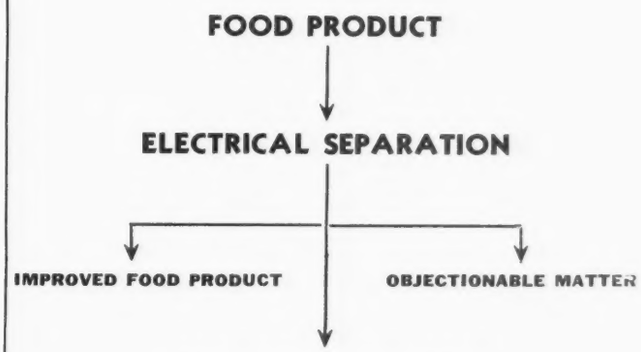
Vilter
ICE-MAKING AND REFRIGERATING MACHINERY

52-30

SINCE 1867

Bulletins and data or special reports are available on request.

Another New Way to Improve Your Product . . .



LOW OPERATING COST
NO ROYALTIES
LOW MAINTENANCE COST

WHILE Electrical Separation is new as applied to food products, installations are consistently giving satisfactory service. Electrical Separation offers possibilities for separations heretofore not possible by other methods.

1. If you have any product where the same weight precludes gravity separation,
2. Where size and shape preclude screen separation,
3. Where similar surface areas preclude air separation,
4. Or where both or neither materials are magnetic.

Investigation will undoubtedly show you how to greatly improve your product—or develop a new product—

•

TECHNICAL SALES CORPORATION
GRAYBAR BUILDING 420 LEXINGTON AVE., NEW YORK
and
CARTHAGE MACHINE COMPANY
CARTHAGE, N. Y.

More than Ordinary Skill *is required for*

STAINLESS STEEL FABRICATION

Stainless Steel has rightfully earned its position as the preferred metal for food manufacturing equipment. With its non-corrosive characteristics, it provides a degree of protection for the purity, taste and color of the product never before attained for practical usage.

However, the fabrication of stainless steels requires craftsmanship above the ordinary. Experience has taught us that the usual handling technique will not suffice, if the full measure of its exceptional protective qualities are to be retained.

We have built many units of stainless steels, understand these alloys, the pitfalls to be avoided, and know the successful methods of fabrication.

This experience has a definite value for you. It is assurance that your stainless steel equipment as we will fabricate it, will deliver full value in long trouble free service with the retention of every protective quality for your product. Intelligent cooperation is yours for the asking.

Specialists in Tanks, Vats, Holding Tanks, Storage Tanks, Steam Jacketed Vessels, Vacuum Pans, etc.

CREAM CITY BOILER CO.

1603 So. 43rd St., Milwaukee, Wis.

Alloy Products & Steel Tanks

BETTER FLOORS

can be laid

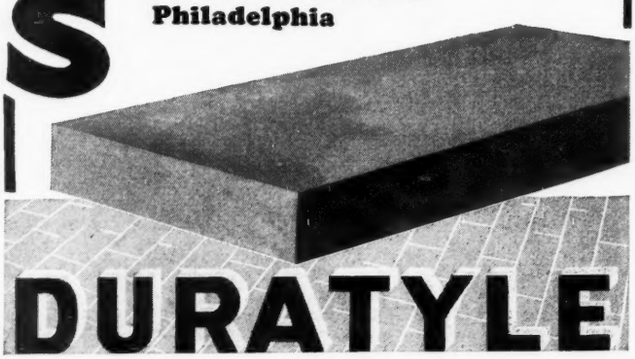
RIGHT OVER OLD FLOORS

Another of the many advantages DURATYLE offers to the meat packer and sausage manufacturer — it can be laid right over the old floor. No department tie ups. The average sized job can be installed overnight. A blessing to the busy packer who needs his plant facilities and BETTER FLOORS at the same time.

Our organization is equipped to handle the entire job, including installation. With this service goes a guarantee — a guarantee to provide floors that look better, last longer, and "lick" your floor problems. Could you ask more?

Write today for description and details.

DREHMANN
Paving & Construction Co.
508 Glenwood Ave.
Philadelphia



DURATYLE

The Wooden Barrel will "give" slightly against a crushing blow, but spring back once the pressure is released.

STRENGTH

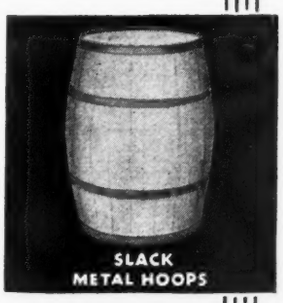
In the engineering fraternity the dome is recognized as a structure of exceptional strength.

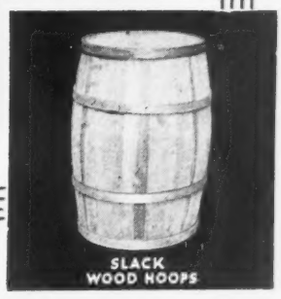
The structural characteristics of a barrel are strikingly similar to the dome. A force applied at any one point on the barrel is distributed over the entire structure. This feature of barrel design gives remarkable superiority in strength.

Also the wooden barrel is resilient to shocks, and can withstand enormous external pressures and crushing impacts without damage. It brings you the ultimate in protection for your product.

Wet or dry, light or heavy, your product can be shipped economically in barrels. The Associated Cooperage Industries of America can advise you as to the type best suited for your purpose. Send for the Wooden Barrel Booklet.

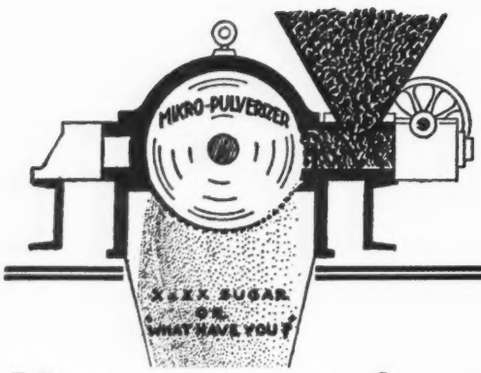
WOODEN BARRELS





THE ASSOCIATED COOPERAGE INDUSTRIES OF AMERICA

RAILWAY EXCHANGE BUILDING
ST. LOUIS MISSOURI



Many manufacturers are forecasting 1932 savings - - - - NOW!

They are taking steps in the right direction today—while there is still time left to put their houses in order for next year's business.

These manufacturers know definitely that they are going to cut costs with MIKRO-PULVERIZER—*and how much.* They have sent samples of their products to us for laboratory test under their own production conditions and accepted our reports of the savings they can expect. They know where they're headed toward profits.

So can you—at no expense whatever.

Why not get the facts immediately while there's still an opportunity to start the year off on the right foot—toward dividends?

Here are a few prominent users of MIKRO-PULVERIZERS who are profiting by accepting the services of our Research Department.

◆

Ambrosia Chocolate Co.
American Sugar Refining Co.
Battle Creek Food Company
Borden Company
Bowey's, Inc.
California Milk Products Co.
Adolph Coors Company
Crown Fruit & Extract Co.
Dextora Company
Dugan Bros., Inc.
First National Stores
Frank H. Fleer Corp.
D. Ghirardelli Co., Inc.
Hershey Chocolate Corp.
H. Kohnstamm & Co., Inc.
Kraft-Phenix Cheese Co.
Langendorf United Bakeries
Loose-Wiles Biscuit Co.
Mead-Johnson Co.
National Biscuit Co.
Nestlé's Food Co.
Rockwood & Co.
Runkel Bros., Inc.
Siren Mills Corp.
W. J. Stange Co.
Standard Brands, Inc.
Toddy, Inc.
United Fruit Co.
Walgreen Co.
Warner-Jenkinson Co.

PULVERIZING MACHINERY CO.
30 Church St., New York

•

Pulverizing Machinery Company
30 Church St., New York City

Gentlemen:

Please send me your new booklet describing the Mikro-Pulverizer. It is understood that this request incurs no obligation.

Name .....

Position .....

Company .....

Address .....

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• TO ADVERTISERS •

This index is published as a convenience to the reader. Every care is taken to make it accurate, but *Food Industries* assumes no responsibility for errors or omissions.

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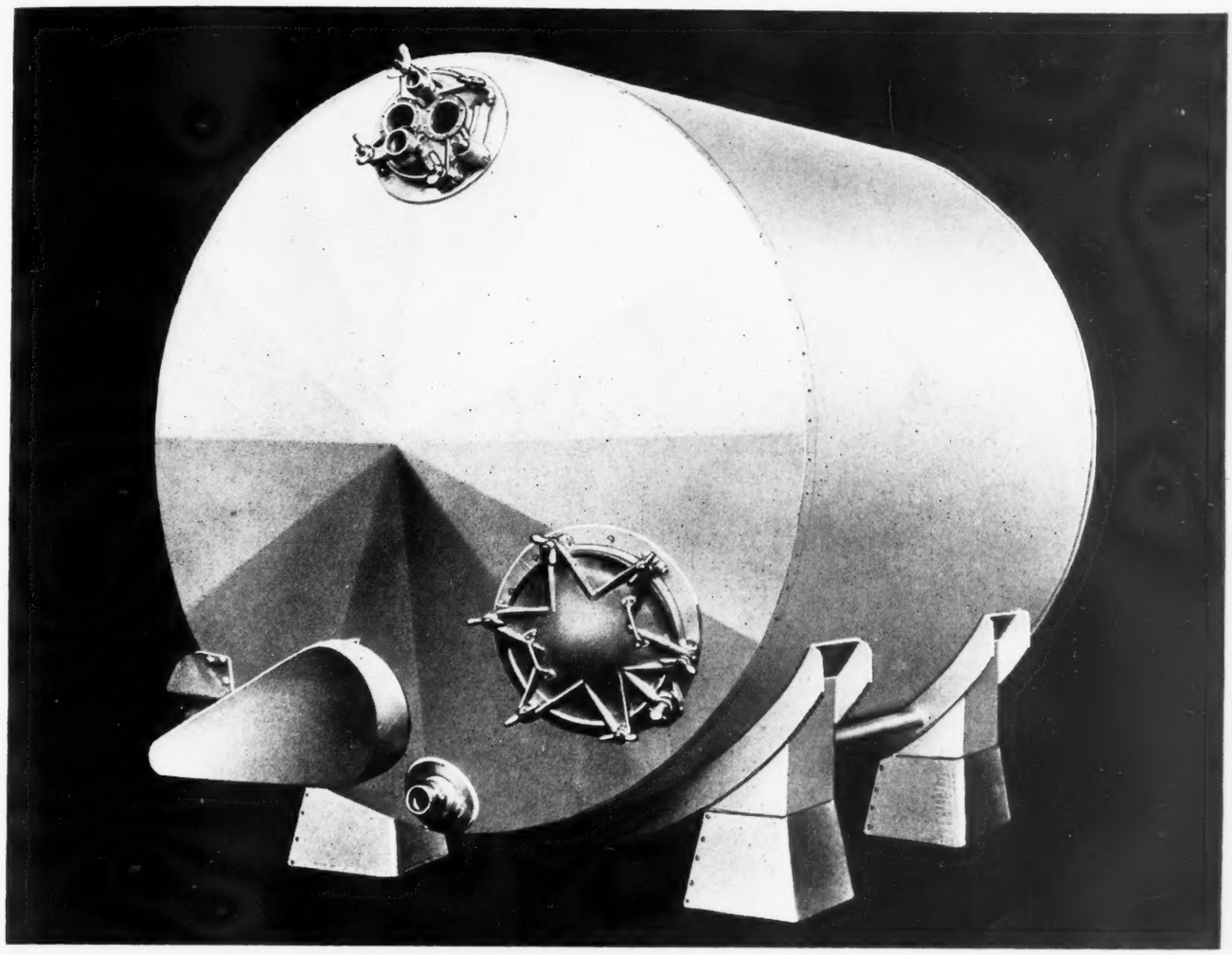
Write to the Equipment Information Bureau of* FOOD INDUSTRIES *for "where-to-buy" data on any products on which you would like further details.



by the

PIONEERS OF STANDARDIZED CONSTRUCTION

PRODUCED in Cherry-Burrell shops devoted exclusively to tank fabrication . . . standardized . . . backed by years of concentrated research and constant development . . . Cherry-Burrell Cylindrical Storage Tanks make available the outstanding advantages of chrome nickel steel construction without price penalty.

Horizontal or vertical types . . . 500 to 5000 gallon capacities . . . all welded polished chrome nickel steel lining . . . insulated with 2-inch (3-inch optional) solid corkboard . . . outer jacket of plate steel welded over insulation thus supporting and strengthening the inner lining. Only three openings . . . manhole door . . . special single door in which are mounted three-inch inlet, vent, electric light fitting and inspection glass . . . and 3-inch outlet with sanitary thread.

Thorough agitation by 15-inch chrome nickel steel impeller.

Safeguard your product with non-corrosive, all-welded chrome nickel steel storage tanks built by pioneers who, by long experience and concentrated application, have learned to fabricate this metal. Write for specifications, descriptions and low prices on standardized units.

"COORDINATED EQUIPMENT" by CHERRY-BURRELL

Cherry-Burrell also produces a completely standardized line of insulated chrome nickel steel rectangular tanks in the same sizes.

CHERRY-BURRELL CORPORATION
427 W. RANDOLPH ST.
CHICAGO

Insoluble ... in highly concentrated fruit juices

Allegheny Metal withstands the attack of all food acids . . . guards them from taint. It's the safe metal.

CONCENTRATED FRUIT JUICES *mean quick destruction to ordinary metals, but not to Allegheny Metal. Hence it is used in these hoppers by Fruit Industries, Inc.*

CONCENTRATED fruit juices, concentrated food acids . . . these products mean the doom of ordinary equipment. They must be handled in Allegheny Metal if the equipment is to last, and if the product is to be absolutely untainted.

Here's the reason . . . Allegheny Metal is as insoluble as glass. And it cleans as easily as glass. Yet it has far greater strength than mild steel, strength to support itself without heavy reinforcement.

For these reasons, manufacturers of all kinds of food products are installing equipment of Allegheny Metal. Many of the most famous foods are prepared in equipment made of this alloy.

Undoubtedly some of your friends are now using Allegheny Metal in their processes. Call on them. Inspect their equipment. Ask their opinion of it. Specify Allegheny Metal . . . almost any fabricator of equipment can furnish it.

●

ALLEGHENY STEEL COMPANY, Brackenridge, Pa., *Offices:* New York, Buffalo, Chicago, Cincinnati, Cleveland, Detroit, Philadelphia, St. Louis, Washington, D. C., Milwaukee, Los Angeles. *Warehouse Stocks:* Joseph T. Ryerson & Son, Inc.—Chicago, Cleveland, Milwaukee, St. Louis, Cincinnati, Detroit, Buffalo, Boston, Jersey City, Philadelphia . . . *In Canada:* Samuel, Son & Co., Ltd., Toronto.

5964

QUICK FACTS

1. Resists more corrosive agents than any other alloy.
2. Can be drawn, stamped, machined, spun, cast, forged.
3. Far stronger than mild steel.
4. Will take any finish from dull to mirror.
5. Is non-magnetic
6. Resists denting and abrasion.
7. Is readily annealed; may be welded and soldered.
8. Is produced in practically all commercial forms.
9. Immune to chemical reactions resulting from cooking and preparation of food . . . does not affect flavor, color or purity of any food.

Allegheny METAL

Manufactured pursuant to license from the Chemical Foundation, Inc., under basic patents No. 1,316,817, and No. 1,339,378

ALLEGHENY METAL